

15605

W.P.
(CEIP)

Hawaii. Dept. of Planning and Economic Development.

COASTAL ENERGY IMPACTS IN HAWAII:
Existing and Planned Energy Facilities
and
General Impact Assessments

COASTAL ZONE
INFORMATION CENTER

by
Dr. Bruce S. Plasch
for the
COASTAL ZONE MANAGEMENT PROGRAM

Department of Planning and Economic Development

State of Hawaii
==

November 1979

CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
A. Content and Purpose	2
B. Types of Energy Facilities Covered	3
C. Types of Impacts Covered	4
D. Methodology for the Inventory of Energy Facilities and Impact Assessments	5
E. Organization	8
II. THE FEDERAL COASTAL IMPACT PROGRAM	9
A. Planning Grants	11
1. Possible Uses of Planning Grants	11
2. Energy Facility Inventory and Allotment of Planning Grants	12
B. Formula Grants	14
C. Loans and Guarantees	15
D. Environmental Grants	16
III. MAINTENANCE OF THE INVENTORY OF ENERGY FACILITIES AND THE IMPACT ASSESSMENTS	18
A. Motivation for the Annual Update	19
B. Annual Updating Procedures	19
IV. RECOMMENDATIONS	22
A. On-Going Energy Impact Activities	23
B. Designation of Energy-Impact Coordinating Office	26
C. Unaddressed Impacts	27
1. Impacts from Large Sugarcane-Hauling Trucks	27
2. Cumulative Energy-Facility Impacts in the Barbers Point Area	28

	<u>Page</u>
D. Recreational and Environmental Losses Caused by the Kahe Power Plant Outfall	30
E. Regulation of Energy Developments	32
1. A Possible Gap in the Public Review Process	32
2. Consolidated Permits and Concurrent Reviews	34
3. Other Suggested Improvements in the Regulation of Energy Activities	34
F. Monitoring of Alaskan Outer-Continental-Shelf Oil Development and Expansion of Refinery Capacity in Hawaii	35
G. Lobbying for Expansion of the Federal Energy Impact Program	37

APPENDIX

A. DESCRIPTION OF THE COASTAL ENERGY IMPACT PROGRAM FROM THE <u>1979 CATALOG OF FEDERAL DOMESTIC ASSISTANCE PROGRAMS</u>A-1
B. CONTACTS FOR UPDATING THE ENERGY FACILITY INVENTORY AND IMPACT ASSESSMENTSB-1
C. INVENTORY OF ENERGY FACILITIES: EXISTING AND PLANNEDC-1
D. GENERAL IMPACT ASSESSMENTS FOR ENERGY ASSESSMENTSD-1

BIBLIOGRAPHY

CHAPTER I
INTRODUCTION

<u>Contents</u>	<u>Page</u>
A. Content and Purpose	2
B. Types of Energy Facilities Covered	3
C. Types of Impacts Covered	4
D. Methodology for the Inventory of Energy Facilities and Impact Assessments	5
E. Organization	7

CHAPTER I
INTRODUCTION

A. Content and Purpose

In an effort to assume some of the responsibility for the consequences to local government of energy development projects which have been undertaken to meet national needs, the Federal government initiated the Coastal Energy Impact Program (CEIP). The CEIP provides grants, loans, and loan guarantees to communities to:

- Plan for the consequences of coastal energy development;
- Provide front-end financing for public facilities and services required by coastal energy activity; and
- Prevent, reduce, or ameliorate unavoidable losses to the coastal zone environmental and recreational resources.

This study, which is funded under a CEIP Planning Grant, encompasses:

- An inventory of existing and planned energy facilities, with an emphasis on projects that are now or will soon be under construction;
- A general impact assessment for each type of energy facility along with measures to avoid, reduce, or ameliorate adverse impacts;
- Guidelines on keeping the inventory and impact assessments up to date;
- A review of Federal programs that are available for coping with the adverse impacts of energy activities; and
- Recommendations for action and further analysis.

The information contained in this report should be of value in:

- (1) coping with adverse energy impacts, (2) taking advantage of the Federal CEIP, and (3) guiding subsequent work.

Not included in this study, however, is a long-term assessment of Hawaii's alternative energy potentials. Such an assessment is available in four relatively recent publications:

Department of Planning and Economic Development, Energy Resources Coordinator 1978 Annual Report, Honolulu, Hawaii, January 1979.

Department of Planning and Economic Development, Handbook on Renewable Alternative Energy Resources in the State of Hawaii, Honolulu, Hawaii, May 1979.

Hawaii Natural Energy Institute, University of Hawaii at Manoa, Annual Report 1978, Honolulu, Hawaii.

Hawaii State Senate, Committee on Economic Development and Energy, Legislative Energy RD&D Workshop Handbook, Volumes I and II, Honolulu, Hawaii, November 1979.

B. Types of Energy Facilities Covered

The energy facilities covered in this study are those coastal facilities that are broadly defined as being directly involved in producing, processing, storing, or transporting energy resources, or as any facility primarily used to produce equipment used in the production, processing, storage, or transportation of energy resources. Coastal facilities include all energy facilities in the State since the only areas excluded from Hawaii's coastal zone are those that are designated as State Forest Reserve.

Facilities which are not defined as energy facilities are those that convert or process an energy resource into a non-energy product. For example, a plant that produces asphalt would not be considered an energy facility.

Not all energy facilities are covered in the study, however. Excluded are all but a few energy facilities operated by the military. Also, facilities

for which firm construction plans have yet to be announced are not covered. For example, submarine electric cables for connecting the islands have not yet been included in the inventory and impact assessments.

Finally, those energy facilities which are small in scale but large in number (i.e., the thousands of solar hot-water heaters for homes and apartments) are not individually inventoried, but are included as a group.

The specific details given for each energy facility in the inventory (see Appendix C) are those that are desired by the Federal government for operation of the CEIP, and are details commonly regarded as being of value for energy planning.

C. Types of Impacts Covered

The assessment of impacts given for each type of energy facility is a summary assessment limited to just the significant impacts. Following Federal guidelines, the coastal zone is "significantly affected" by the siting, construction, expansion, or operation of an energy facility if such activity:

- Causes or is likely to cause population changes in the coastal zone;
- Changes or is likely to change employment patterns in the coastal zone, including those in fishing and tourism;
- Damages or threatens to damage any valuable environmental or recreational resources in the coastal zone, including air, water, or noise quality; or
- Increases or threatens to increase risks to public safety and real property in the coastal zone.

The primary use of the impact assessments will be to design mitigating measures for adverse impacts, and to plan facilities and services needed to

accommodate energy activities. In view of this, the types of impacts stressed in the assessment are:

- Adverse impacts, particularly environmental and recreational ones;
- and
- Impacts that will require new or expanded government facilities and services (roads, water, sewers, police, fire, health, parks, schools, etc.).

The beneficial impacts of new energy facilities and resulting economic growth and stability are implied and are not fully documented.

The assessments include those impacts that:

- Are direct, indirect, or cumulative;
- Are short-term or long-term;
- Pose a significant risk;
- Involve an irrevocable commitment, loss, or destruction of a resource;
- Curtail the range of beneficial uses; or
- Conflict with Federal, State, or County policies.

If a study is warranted to resolve uncertainty over a potentially significant impact, it is noted in the assessment.

The Checklist of Possible Impacts listed in Table I-1 was used as a guide in developing the impacts so as to reduce the chances of having important impacts overlooked.

D. Methodology for the Inventory of Energy Facilities and Impact Assessments

The inventory of coastal energy facilities and assessment of impacts and mitigating measures was developed as follows:

TABLE I-1. CHECKLIST OF POSSIBLE IMPACTS

Economic Impacts:

- Jobs: number, type, temporary (construction) or permanent, wage levels, and location
- Sales and expenditures: direct and indirect
- Taxes: revenues--expenditures and rates

Population Growth and Community Development Patterns:

- Population change: amount, rate, temporary or permanent, and location
- Housing: amount, location, type, density, and price

Infrastructure and Service Requirements and Loads:

- Infrastructure requirements--congestion and increased risk of overloads: roads, water supply, sewers, airports, schools, parks, etc.
- Availability and quality of services: police, fire, education, health, etc.

Environmental Impacts:

- Pollution: water, air, noise, odors, thermal, litter, visual, etc.
- Erosion and sediment
- Threatened ecosystems: streams, estuaries, coastal waters, etc.
- Threatened or endangered species: animal, plant, fish, etc.
- Increased risk of fresh-water shortages
- Increased vulnerability to floods, tsunamis, landslides, volcanic eruptions, earthquakes, etc.
- Potential health problems

Social Impacts:

- Disrupted lifestyles and communities
- Forced out-migration
- High in-migration of people having strongly differing values and lifestyles
- Threatened historic, cultural, and archaeological sites and access
- Recreation activities threatened by excessive demand or loss of access: camping, swimming, surfing, snorkeling, fishing, hiking, biking, boating, hunting, etc.

(1) A preliminary inventory of energy activities was assembled based on published yearly reports and discussions with representatives of those agencies responsible with coordinated energy activities in Hawaii. These coordinating agencies included in particular:

- The State Energy Office of the Department of Planning and Economic Development (DPED);
- The Center for Science Policy and Technology Assessment of the DPED; and
- The Hawaii Natural Energy Institute of the University of Hawaii.

(2) For each type of energy activity, preliminary summary assessments of impacts and mitigating measures were prepared based on one or more representative environmental impact statements and sources which discuss impacts.

(3) For each facility, the project manager or representative was then contacted for his review and completion of the inventory details and general impact assessment.

(4) In addition to the facility project managers and representatives, reviewers of the material included various coordinating agencies and private organizations concerned with energy development and environmental quality. These included:

- The State Energy Office;
- The Center for Science Policy and Technology Assessment;
- The Hawaii Natural Energy Institute;
- The Department of Health;
- The Office of Environmental Quality Control;
- Each of the four County energy coordinators; and
- Life of the Land.

(5) The inventory of energy facilities and impact assessment was then revised based on the comments of the various reviewers.

E. Organization

The following chapter provides a discussion of the Federal Coastal Energy Impact Program (CEIP), and the various grants, loans, and loan guarantees that are available. Additional information on the CEIP is given in Appendix A.

Chapter III gives procedures for annually updating the inventory of energy facilities and the impact assessments. The contacts needed for performing the update are given in Appendix B.

➤ The actual inventory of energy facilities and the general impact assessments are given in Appendices C and D respectively.

The recommendations for action and further analysis are in Chapter IV.

CHAPTER II
THE FEDERAL COASTAL IMPACT PROGRAM

<u>Contents</u>	<u>Page</u>
A. Planning Grants	10
1. Possible Uses of Planning Grants	10
2. Energy Facility Inventory and Allotment of Planning Grants	11
B. Formula Grants	13
C. Loans and Guarantees	14
D. Environmental Grants	15

CHAPTER II

THE FEDERAL COASTAL ENERGY IMPACT PROGRAM

The Coastal Energy Impact Program (CEIP) was created by the 1976 amendments (P.L. 94-370; 16 U.S.C. 1451, et seq.) to the Coastal Zone Management Act of 1972.¹ The purpose of the CEIP is to provide coastal states and communities with financial assistance for mitigating the adverse impacts associated with coastal energy development activity. Under provisions of Section 308, the CEIP provides grants, loans, and loan guarantees to communities to: plan for the consequences of coastal energy development; provide front-end financing for public facilities and services required by coastal energy activity; and prevent, reduce, and ameliorate unavoidable losses to the coastal zone environmental and recreational resources. The financial assistance is restricted to coping with the impacts of energy facilities that are new or expanded after July 26, 1976--the date when the CEIP was signed into law.

The CEIP has four basic categories:

- (1) Planning Grants (Section 308(c));
- (2) Formula grants (Section 308(b));
- (3) Loans and guarantees (Sections 308(d) (1) and (2)); and
- (4) Environmental grants (Section 308(d) (4)).

These four programs are discussed below, while their description as given in the 1979 Catalog of Federal Domestic Assistance is reproduced in Appendix A.

Of interest to Hawaii is that Senator Daniel Inouye is a member of the Senate Appropriations Committee, which helps determine appropriations for the CEIP.

¹Federal Register, Vol. 44, No. 54--Monday, March 19, 1979.

A. Planning Grants

1. Possible Uses of Planning Grants

CEIP Planning Grants are available for the study of and planning for the consequences of energy facilities. These may be economic, social, or environmental consequences which have occurred, are occurring, or are likely to occur as the result of the siting, construction, expansion, or operation of new or expanded energy facilities. CEIP Planning Grants may pay up to 80 percent of the costs of eligible planning activities.

Allowable uses of these Planning Grants cover:

(1) Planning for the consequences of general energy activities, including:

- Analysis of government or private policies affecting the location, type, and operation of energy facilities;
- Devising strategies for the public purchase of land or the establishment of land-use controls for lands upon or near which energy development is to take place;
- Devising methods of protecting environmental or recreational resources threatened by energy facility development; and
- Conducting risk management studies, hazard analysis, emergency contingency planning, and assessment of mitigating measures to protect public safety.

(2) Planning for the consequences of specific energy facilities, including:

- Studies of direct and indirect changes in population, employment patterns, demand for housing, needs for public facilities and services, government revenues, tourism, environmental quality, use of recreational resources, public safety, etc.;

- Comparative cost/benefit and other analyses of the consequences of alternative energy facility sites or types;
 - Analysis of required governmental decisions on zoning, licensing, leases, regulations, etc.;
 - Devising strategies for recovering compensation from appropriate parties for any adverse effects caused by energy facilities; and
 - Planning for public facilities which may be required because of the energy facility.
- (3) Carrying out activities necessary to administer the CEIP, including:
- Maintaining an inventory of energy activities;
 - Data collection and analysis; and
 - Designing and carrying out a process of allocating CEIP assistance among the counties.

An example illustrating the possible use of CEIP Planning Grants would be the problem of identifying a suitable location of a major energy facility. A community may have to conduct a natural resource inventory, gathering important data on local physical conditions; it may have to plan for improved means of transportation to and from the facility; community development planning may be required to locate new homes and businesses to support new residents; and plans may have to be made for the location and scheduling of required new public facilities.

2. Energy Facility Inventory and Allotment of Planning Grants

The allocating of Planning Grants to smaller states such as Hawaii will be an annually determined minimum share plus a formula share based on planning need. This planning need is based primarily on the sum of estimated peak construction employment and peak operating employment for all energy facilities included in a "CEIP Energy Facility Inventory for Section 308(c) Planning Grants."

This inventory includes those energy facilities that:

- Produce, process, store, or transport energy resources (but excluding those facilities that convert or process an energy resource into a non-energy resource);
- Produce equipment used in the production, processing, storage, or transportation of energy resources;
- Are new or expanded (in terms of siting, construction, or initial operation) after July 26, 1976;
- Are now being sited, constructed or initially operated, or will be sited, constructed, or initially operated in the near future as indicated by application or approval of a major Federal or State permit, or other reasonable evidence;
- Will not become fully operational in the fiscal year for which the inventory is being prepared (i.e., a facility that becomes operational in FY 1979 will not be included in the inventory used to calculate the FY 1980 allotment);
- Have been on the inventory less than four years in which the State received Planning Grants, although facilities may be retained on the inventory for more than four years if it is demonstrated that planning is needed to prevent damage to valuable coastal environmental or recreational resources;
- Significantly affect the coastal zone (because of its siting, construction, expansion, or initial operation) in terms of:
 - Changing or threatening to change population levels or employment patterns;
 - Damaging or threatening to damage or degrade environmental quality or recreational resources;

- Increasing or threatening to increase risk to public health, safety, or real property; and

--There is reasonable evidence of a need to plan for or study the effects of the facilities.

B. Formula Grants

The Formula Grants Program is one of the better funded of the Federal programs available for coping with coastal energy impacts. If Hawaii should be able to qualify for participation in this program, then it would be eligible for the minimum level of funding. For FY 80, this level is \$555,000 plus another \$100,000 for administration. As long as the expenditure of funds is designed to cope with impacts of eligible energy activities, the funds can be used for the planning, development, and implementation of a wide variety of new or improved public facilities and services, and for the amelioration of environmental and recreational losses. Under this grant category, public facilities and services include police and fire protection activities and equipment, schools, water supply, roads, docks, navigation aids, waste collection and treatment, hospitals, and health care.

However, eligibility for the formula grants is tied to Outer-Continental-Shelf (OCS) oil and gas activities, which obviously do not exist in Hawaiian waters. Therefore, in order to qualify for the formula grants, it must be shown that Hawaii is impacted by the OCS oil and gas development in Alaska or California. Currently, such impacts are very speculative and minor, and include (1) possible increased tourism to Hawaii by Alaskan oil workers seeking rest and recuperation, and (2) a possible decline in the population of whales that visit Hawaii in the winter because of having their summer feeding grounds in Alaska adversely affected by OCS oil and gas activities.

There are, however, some impacts from OCS oil and gas activity that are likely to eventually occur here in Hawaii. After OCS oil production begins in Alaska, a portion of it will probably be refined here in expanded facilities, and then shipped on to the mainland for use there. When this occurs, Hawaii will be eligible for the Formula Grants, and may use them to help provide facilities, infrastructure, and services in support of the refinery and transshipment activities.

C. Loans and Guarantees

Credit assistance is available to help finance new or improved public facilities and services needed because of coastal energy activities. This may include financial assistance for facilities and equipment needed for: education, environmental protection, government administration, health care, public safety and law enforcement, recreation, and public utilities. Credit assistance is also available for purchase or protection of environmental and recreational resources that may be threatened by energy development.

If the public facility primarily serves industrial facilities, then in order to qualify for the credit assistance, industrial user charges are required as the primary source of revenues to repay the loan.

The credit assistance is available in three forms: direct loans, bond guarantees, and repayment assistance.

Direct loans are available from the Coastal Energy Impact fund, and can be made for periods of up to 30 years. The interest rate varies according to project need, and applicant's financial condition, and State statutory interest-rate ceilings on municipal obligations.

Bond guarantees for principal and interest are also available from the Coastal Energy Impact Fund. The interest paid on such an obligation, however,

is taxable, so the interest rate would be higher than that for Hawaii bonds, which are tax-free. An interest subsidy sufficient to lower the interest rate to that available on direct loans may be paid to the borrower.

Repayment assistance is a special and unique feature of the CEIP. Under this provision, a borrower may receive special assistance if revenues that secure the loan or guaranteed bond prove insufficient to service the debt because employment or population increases expected from the project did not materialize. The forms of this assistance may include: modification of loan terms, including interest-rate reduction and principal postponement; refinancing and supplemental loans; and grants to meet the debt service on the loan.

The loan and guarantee program is well-funded and Hawaii can participate. However, the available interest rates range from a high of the average yield on U.S. securities (8 percent in 1979) to a low equal to the average yield on the lowest investment grade of municipal securities (6 percent in 1979). The rate provided will depend on the financial circumstances of the particular community. Since Hawaii State and County bond rates are near or slightly below the lowest rate, there is no advantage to Hawaii in participating in this program.

However, there is an important exception. Environmental and recreational projects, such as beach access and wetlands conservation, are eligible for Federal loans at 5 percent interest, which is below the interest rate available on Hawaii bonds.

D. Environmental Grants

Environmental grants are awarded to design and implement programs to prevent, reduce, or ameliorate unavoidable losses of valuable environmental and recreational resources (including cultural, historic, and archeological

resources) which result from non-governmental coastal energy activities. This may involve the protection, restoration, acquisition, or improvement of the environmental or recreational resources. If, for example, the siting of an energy facility in the past resulted in the loss of or damage to a public beach, a community could use CEIP grants to purchase access rights to a similar beach area. Regulations define "unavoidable" losses as those which cannot be traced to any identifiable party or are otherwise not preventable because of facility siting needs.

Although this program is of potential value to Hawaii, there is no funding for FY 80. However, funding is anticipated for the years to follow and priority may be given to the states that are not eligible for the OCS Formula Grants.

CHAPTER III

MAINTENANCE OF THE INVENTORY OF ENERGY FACILITIES
AND THE IMPACT ASSESSMENTS

<u>Contents</u>	<u>Page</u>
A. Motivation for the Annual Update	18
B. Annual Updating Procedures	18

CHAPTER III

MAINTENANCE OF THE INVENTORY OF ENERGY FACILITIES AND THE IMPACT ASSESSMENTS

A. Motivation for the Annual Update

The inventory of existing and planned energy facilities and the general assessment of impacts and mitigating measures should be updated annually. This information is needed in order to provide in a timely manner the facilities, services, and mitigating measures needed to properly accommodate energy developments. Also, the information should be of value in guiding decision makers regarding the types of energy developments most compatible to Hawaii's environment.

An annually updated inventory of coastal energy facilities is also needed if Hawaii is to receive the entire allotment of CEIP Planning Grants to which the State is entitled. Finally, the energy activity inventory and assessment of impacts and mitigating measures should be of value in allocating these planning grants as well as other resources provided to cope with energy impacts.

B. Annual Updating Procedures

The process for updating the inventory of coastal energy facilities and the general assessments of impacts and mitigating measures is given below. The process covers six steps that involve interaction with the contacts listed in Appendix B.

(1) Initial Updating of Energy Facilities, Status, and Contacts

The first step in updating the inventory of energy facilities is to review the annual reports listed in Table B-1. The review should focus on identifying facilities which should be added to the inventory, and on

determining the status of energy facility projects. Following this, personnel contact should be made with the two agencies listed under alternative-energy activities in order to identify additional projects not listed in the annual reports and to update the list of contacts given in Tables B-2 through B-10.

(2) Review Environmental Impact Assessments and Update the General Assessment of Impacts and Mitigating Measures

For those new projects for which Environmental Impact Statements (EISs) have been written, the statements should be reviewed in order to update the general assessments of impacts and mitigating measures.

(3) Updating by Project Managers and Representatives

The third step is to communicate with those designated as contacts for the various energy facilities; the initial list of such contacts is given in Tables B-2 through B-8. To the extent possible, project managers, rather than coordinators for numerous projects, should be contacted. This is because project managers are generally more familiar with the current status of projects, and the information request for a single project is far less burdensome than it is for a group of projects.

For those energy facilities for which they are responsible, the contacts should be requested to:

- Review and update the details of facilities already included in the inventory;
- Add additional energy facilities to the inventory, along with the relevant details of each (see Appendix C); and
- Review and update the relevant general assessment of impacts and mitigating measures (see Appendix D).

(4) Institutional Review of General Assessment of Impacts and Mitigating Measures

The updated general assessment of impacts and mitigating measures should

next be reviewed by those having broad responsibilities for reviewing impacts (Table B-9). The review should be for accuracy and completeness. Suggestions for significant additions or changes should be checked with the appropriate contacts.

(5) Institutional Review of Overall Energy Activities

The final step in updating the energy facility inventory and general assessment of impacts and mitigating measures should be a review by those institutions having broad responsibilities in the field of energy development (Table B-10). This review allows for a final check for completeness and accuracy by those most familiar with energy activities in the State. The review may also be beneficial to the various energy coordinators in terms of providing them a status report on energy facility developments.

CHAPTER IV
RECOMMENDATIONS

<u>Contents</u>	<u>Page</u>
A. On-Going Energy Impact Activities	22
B. Designation of Energy-Impact Coordinating Office	25
C. Unaddressed Impacts	26
1. Impacts from Large Sugarcane-Hauling Trucks	26
2. Cumulative Energy-Facility Impacts in the Barbers Point Area	27
D. Recreational and Environmental Losses Caused by the Kahe Power Plant Outfall	29
E. Regulation of Energy Developments	31
1. A Possible Gap in the Public Review Process	31
2. Consolidated Permits and Concurrent Reviews	33
3. Other Suggested Improvements in the Regulation of Energy Activities	33
F. Monitoring of Alaskan Outer-Continental-Shelf Oil Development and Expansion of Refinery Capacity in Hawaii	34
G. Lobbying for Expansion of the Federal Energy Impact Program	36

CHAPTER IV
RECOMMENDATIONS

A. On-Going Energy-Impact Activities

As noted in many sources, Hawaii is unusually dependent on imported petroleum as its primary energy source. No fossil fuel reserves exist in the State, no coal is transported by rail, no natural gas enters by pipeline, and no regional grid exists to bring in electrical power from other states. Consequently, Hawaii's economy is unusually vulnerable to interruptions in oil supplies and oil price increases.

At the same time, Hawaii has the greatest potential of any state in the nation for achieving electrical energy self-sufficiency based on renewable natural energy resources. The State is favored with strong, steady trade-winds; a high rate of insolation; rapid growing conditions for biomass; very high geothermal temperatures; and tropical oceans with good temperature differentials close to shore. Thus, Hawaii is extremely well-suited for research and development of energy technologies based on wind, direct solar, biomass, geothermal, and ocean thermal energy conversion.

In view of the above, the development of Hawaii's renewable natural energy resources is one of the highest priority activities of the State government and of many private companies. The result is a high level of research and development of alternative energy resources conducted by various State and County agencies, the University of Hawaii, the military, and many private firms. This activity is only partially reflected by the inventory of Appendix C, since the inventory excludes activities that do not require facilities. Note that the inventory is probably incomplete, since private companies often do not announce planned facilities until construction is nearly ready

to begin, or may never announce those facilities that are relatively small or common. Furthermore, the inventory does not reflect the likelihood that certain alternative energy technologies may be on the threshold of accelerated development; such may be the case with geothermal power, WECS, and possibly OTEC.

For many of the alternative energy developments--such as geothermal power, wind energy farms, and OTEC--there is little or no experience in Hawaii regarding their impacts and infrastructure requirements.

In view of the high level of energy development ongoing in Hawaii and the likelihood of an acceleration, and the possibility of significant and unforeseen impacts, considerable effort is warranted on studying potential impacts and ways to avoid or minimize the adverse ones. The State and Federal Environmental Impact Statement processes and monitoring of air and water emissions will fulfill a portion of this need. But there is a need for additional activities. *Specifically, there is a need for and funding of the following additional energy impact activities:*

(1) Conduct Special Baseline Studies

Special environmental, social, and economic baseline studies should be conducted for areas targeted for major energy facilities if such baseline studies would otherwise not be conducted, would be inadequate (possibly because the initial facilities could be relatively small and limited in scope), or would not be done in a timely manner to allow energy development to proceed when desired.

Thorough baseline studies are needed in order to learn the impacts of subsequent energy developments and the adequacy of mitigating measures.

(2) Conduct Follow-Up Surveillance of Impacts

There should be periodic follow-up surveillance of the impacts of

energy activities, particularly the newer alternative energy approaches such as geothermal, wind farms, and OTEC.

The purpose of such a surveillance would be to test the accuracy of the initial impact assessments, the adequacy of mitigating measures, and to detect environmental or social deterioration and hazardous trends before they become costly to correct or irreparable.

(3) Maintain the Assessments of Energy Facility Impacts and Appropriate Mitigating Measures

Environmental Impact Statements of new energy projects should be reviewed and impacts and mitigating activities monitored in order to keep up-to-date the assessments in Appendix D.

These assessments should allow efficient development of environmental assessments for new energy facilities because of having the knowledge from past projects readily available. Furthermore, decision makers will be able to make more informed judgment of anticipated impacts and appropriate mitigating measures when making decisions on energy facility development.

(4) Investigate Impacts

Impacts not covered in the EIS process should be investigated.

Two examples of impacts not covered by the EIS process are given in Section C below. One example concerns the cumulative impacts that result from a number of energy facilities all located near each other in the Barbers Point area. These cumulative impacts do not surface in any of the EISs prepared for the individual projects. The other example concerns a change in sugar operations that has had adverse impacts, but the change was exempt from the EIS process.

(5) Identify and Resolve Issues

Environmental, social, economic, native claims, institutional, legal, political, and other issues that may be a barrier to desirable energy

development should be identified, the main concerns clarified, alternatives for resolving these concerns evaluated, and appropriate implementing measures developed.

(6) Investigate Rules and Regulations

Rules and regulations that affect energy activities should be investigated to determine their adequacy for avoiding or minimizing adverse impacts without being overly burdensome.

Specific regulatory problems are discussed in Section E below.

(7) Maintain the Inventory of Energy Facilities

The inventory of energy facilities should be maintained so that Hawaii can take maximum advantage of the Federal CEIP, and more informed judgments can be made as to where resources should be allocated for coping with energy development impacts.

Maintaining the inventory will require a significant amount of effort every year since there is a high and accelerating level of energy development in Hawaii.

(8) Secure and Allocate Energy-Impact Resources

Secure and allocate Federal CEIP funds and other resources available for determining and coping with impacts of energy activities.

B. Designation of Energy-Impact Coordinating Office

In order to avoid gaps in coverage and wasteful duplication of effort, *the responsibility for conducting and coordinating the energy-impact activities discussed in the previous section should be placed within a designated office.* A possible choice for this is the Office of Coastal Zone Management (CZM) within the Department of Planning and Economic Development. The CZM Office has broad responsibilities for coping with impacts within the coastal zone which includes all areas in Hawaii except those designated as State forest

reserve. Furthermore, the CZM Office is the agency now designated for managing the State's allocation of the Federal CEIP Planning Grants.

A further and major advantage of having a designated energy-impact coordinating office is that it would give visibility and focus to the various energy-impact activities, thereby enhancing their success. Directed to such an office would be: information needed to maintain the inventory of energy facilities and impact assessments; information on the need for studies of impacts and mitigating measures, and for projects to cope with energy-activity impacts; and requests for funding for the studies and projects. The Office would also aid others involved in energy development by being a source of information on energy developments, impacts, mitigating measures, and sources of funding for studies and mitigating projects.

To facilitate the exchange of information envisioned, it would be beneficial to have a representative of the proposed energy-impact coordinating office participate in the various State and County committees charged with energy development.

C. Unaddressed Impacts

In the process of developing the general impact assessments contained in Appendix D, the various possible impacts appear to be adequately addressed. However, two exceptions surfaced, and these are discussed below.

1. Impacts from Large Sugarcane-Hauling Trucks

The sugar companies, which generate a considerable amount of power from bagasse and other biomass fuels, have purchased over the years progressively larger and heavier cane-hauling trucks. These more massive trucks have caused accelerated deterioration and higher maintenance costs for certain State and County roads that were designed for smaller vehicles.

This is an impact which has not been dealt with under the normal EIS process. A small study is in order to see if the accelerated road deterioration should be corrected by building heavier-duty roads, and if certain sugar companies should assume a portion of the financial burden for road maintenance or reconstruction.

2. Cumulative Energy-Facility Impacts in the Barbers Point Area

Considerable energy facility development is scheduled for the Barbers Point area. Existing energy facilities in the area include:

- The Chevron Refinery at Campbell Industrial Park;
- The Hawaii Independent Refinery of Pacific Resources, Inc., located at Campbell Industrial Park;
- The Kahe Power Plant of Hawaiian Electric Company;
- The synthetic natural gas plant Enerco, Inc., of Pacific Resources, Inc.;
- The oil recovery facility of Energy Recovery Systems of Hawaii;
- Fuel storage tanks for the first three facilities;
- Offshore mooring facilities for the two refineries;
- A portion of the Oahu Energy Corridor; and
- A barge facility which is used for loading petroleum products.

Facilities in the Barbers Point area that are under construction or are planned include:

- The addition of a hydrocracking unit and expansion of the refinery for Hawaii Independent Refinery;
- The addition of six electric generators and modification of existing facilities to reduce air pollution at the Kahe Power Plant of Hawaiian Electric Company;

- Sixty-three additional storage tanks for Hawaii Independent Refinery, Inc., and three tanks for the Kahe Plant of Hawaiian Electric Company;
- A large field of petroleum storage tanks for the Strategic Petroleum Project;
- Additional offshore mooring facilities for the Hawaiian Independent Refinery, Inc.;
- Coal handling facilities for both Kaiser Cement and Gypsum Corp. and Cyprus Hawaiian Cement Corp.;
- The municipal solid-waste-fueled energy facility HPOWER, which may be located at Campbell Industrial Park;
- The large deep-draft Barbers Point Harbor, with one of the four terminals to be used for handling petroleum products;
- One or more geothermal wells and possibly geothermal generators at Lualualei; and
- A major OTEC facility proposed for location off Kahe Point.

The above indicates considerable energy development in the Barbers Point area. New jobs will be provided by the new or expanded energy activities, by energy-consuming activities that may be attracted or directed to the area, and by activities that service the other activities as well as the families of the new workers. The employment growth will be accompanied by considerable population growth and urbanization of the surrounding area.

The new energy-related growth will likely have substantial environmental, social, and economic impacts. For example, new and expanded energy activities and related industrial development may degrade the surrounding environment and adversely affect the large visitor resort planned for West Beach.

Another likely and significant impact is the urbanization of some of the nearby sugarcane lands of Oahu Sugar Company. This urbanization--combined with proposed urbanization of Waiawa Ridge and around Ewa Town, and diversion of water to domestic use--may eventually threaten the survival of the operation because of losing its economies of scale.

A third type of impact which may grow to be of considerable concern is the social impact along the Waianae Coast. This is an area having high unemployment, recognized social problems, and a recent history of violence directed towards outsiders. Increased energy-related growth in the Barbers Point area will provide needed jobs, but conflicts may occur between newcomers and long-time residents.

In most, if not all, cases the direct impacts of energy developments are adequately addressed in the various EISs. But *the cumulative and substantial indirect impacts of energy development in the Barbers Point area are not adequately addressed. Special analysis and planning will likely be required if the anticipated growth is to be accommodated without causing major problems, such as threatening the planned visitor resort at West Beach, the long-term survival of Oahu Sugar Company, and social problems along the Waianae Coast.*

D. Recreational and Environmental Losses Caused by the Kahe Power Plant Outfall¹

The one energy development in Hawaii that is widely recognized as having caused significant adverse impacts is the Kahe Power Plant of Hawaiian Electric Company. Under requirements imposed by the U.S. Environmental Protection Agency (EPA) and the Department of Health (DOH), a new and longer

¹Contributions of Douglas Meller of Life of the Land for material presented in this section is gratefully acknowledged.

outfall pipe was completed in December 1976 at considerable expense. Its purpose was to carry hot wastewater into deep water where it would diffuse without killing the surrounding coral. This was done because, with the old shorter outfall pipe, the hot water was causing severe damage to a high-quality reef near shore, and degrading the fish habitat.

Although the outfall pipe was buried, a large "box" was built on the shore below the vegetation line to solve the problem of connecting the new outfall pipe to an existing power plant discharge. However, the "box" and outfall destroyed a beach and a surfing site, and blocked public access to and along the shoreline. This recreational loss is widely regarded as being far greater than the damage to coral that was being caused by the hot-water discharge from the old, short outfall pipe.

In consideration of the recreational and environmental loss caused by the Kahe Power Plant outfall, the possibility of using Federal CEIP Environmental Grants (if available) or special 5-percent Federal Loans should be explored for developing compensating projects. Possible projects include:

--Development of a new surfing site.

It would be preferable for this to be somewhere along the Waianae Coast, and could be accomplished by dredging a channel or by constructing artificial shoals. Artificial shoals have the further advantage of reducing storm wave damage and beach retreat, and improving recreational fishing by increasing the number of "niches" available for marine life.

--Acquisition of private shoreline areas with recreational value for the public.

One possibility would be "Barking Sands," a long, narrow strip of land makai of Farrington Highway between the City Keaau Beach Park and the Kaena State Park.

--Restoration of reefs to improve recreational fishing.

Although rather far from Waianae, it may be justifiable to restore the reefs and improve recreational fishing either in Keehi Lagoon or Kanoeha Bay. This could be done by placing small pieces of live coral on the mudflats to "seed" the regeneration of reefs, or by dropping rocks or concrete waste material on top of the mudflats in order to provide a hard bottom for coral on which it can attach.

E. Regulation of Energy Developments

Parties involved in energy development or regulation were asked to comment on: how to better manage energy activities so as to avoid or minimize adverse impacts in the coastal zone while also minimizing delays and problems in developing our energy resources. Possible problems may include the need for: new controls because of gaps in the existing system, the elimination of unnecessary controls because of duplication or other reasons, policies on where energy facilities should be located, refinements in the process that would improve public decision-making and speed the process, and State or County programs to help mitigate adverse impacts.

Since very few environmental or other "mistakes" have been made to date with energy development--with the exception of the Kahe Power Plant outfall--most parties believe that energy activities are adequately managed, although the permit process may take too long and be too costly. *The few specific comments regarding problems with the management of energy activities, which are presented below, should be analyzed for their merit and appropriate resolution.*

1. A Possible Gap in the Public Review Process

The Kahe Power Plant outfall case suggests that *there may have been a gap in the public review process for shoreline structures below the*

vegetation line, particularly if located in rural areas. Apparently, the Waianae residents were not fully informed of the "box" for the outfall and the subsequent impacts, and they did not have the opportunity to participate early in the decision making to voice their preferences. If they had, it is unlikely that the choice would have been to sacrifice a popular beach and surf site in order to save the coral from thermal pollution.

The agencies involved in giving permits for the outfall system were:

- The U.S. Environmental Protection Agency (EPA);
- The State Department of Health (DOH);
- The U.S. Army Corps of Engineers (Corps);
- The County Zoning Board of Appeals (ZBA), with the Department of Land Utilization (DLU) as the staff agency;
- The State Department of Transportation (DOT); and
- The State Department of Land and Natural Resources (DLNR).

The EPA and the DOH were concerned about the thermal pollution effects on the coral, rather than the recreational impacts caused by the "box" on shore. Similarly, the Corps was concerned about the structure in the water, and not the one on shore. The Corps, furthermore, may have had an inadequate outreach program for areas such as Waianae where few, if any, people were on their mailing list for proposed developments. The ZBA's concern was with a shoreline setback variance, which was not required for the "box" since it was built entirely below the vegetation line.

The DOT and DLNR had responsibilities for development along the shore, but their public notice system was inadequate to inform and involve the Waianae residents.

A further problem was that no Environmental Impact Statement (EIS) was required for the project, although Judge King later ruled that the Corps erred in not requiring one.

If there was a gap in the public review process for the Kahe Power Plant outfall "box," it may have since been corrected with the new Special Management Area (SMA) Permits, but possibly not since the SMAs cover areas above the high-water line.

2. Consolidated Permits and Concurrent Reviews

Both environmentalists and developers agree, although for different reasons, that the *permit process should be simplified by consolidating similar permits and holding concurrent reviews*. The concern of the environmentalists is that the current process of obtaining permits consecutively is that the first agency's approval causes a domino effect whereby subsequent agencies find it increasingly difficult to have the project altered significantly. This may have been the case with the Kahe Power Plant outfall; other agencies may have followed the lead of the initial EPA decision favoring the outfall..

The concern with developers over obtaining many permits consecutively--with some of the Federal, State, and County permits being very similar, or requiring the same information but in different formats--is that the process is very time consuming and costly. This is so particularly if the decision of one agency forces a change in the project sufficient to invalidate the permits previously obtained.

Examples of permits mentioned as candidates for consolidation are the similar State and Federal permits for controlling water and air pollution, and hazardous wastes.

3. Other Suggested Improvements in the Regulation of Energy Activities

Three additional improvements in the regulation of energy activities were suggested but were not explored. The first arose out of a *questioning of the need for a complete EIS for each exploratory drilling for geothermal power*. Possibly the EIS information refinements and process can be simplified without increasing environmental and other risks.

The second suggestion had to do with the concern that the regulations being developed by the Environmental Protection Agency (EPA) for the Resource Conservation and Recovery Act may be excessive and thereby force the State's only oil recovery facility to close. If such a closing appears likely, then possibly the EPA can be persuaded to soften their regulations or grant a "grandfathering" exemption, or maybe State financial assistance is justified.

Finally, there was a suggestion that the permit process be simplified and streamlined in designated areas suitable for noxious industries--areas such as Campbell Industrial Park. This would concentrate industry in the least objectionable areas, facilitate control measures, and signal investors that the State has a continuing interest in economic developments.

F. Monitoring of Alaskan Outer-Continental-Shelf Oil Development and Expansion of Refinery Capacity in Hawaii

As discussed in Chapter II, the Formula Grants (Section 308(b)) is one of the better funded categories of the Federal Coastal Energy Impact Program; in FY80, the minimum grant to qualifying states was \$555,000 plus another \$100,000 for administration. The Formula Grant funds can be used for a wide variety of purposes to cope with the impacts of eligible energy activities. Expenditures can be made for planning and development of new or improved public facilities and services, including police and fire protection facilities and equipment, schools, water supply, roads, docks, navigation aids, waste collection and treatment, health care facilities, etc. The funds can also be used to ameliorate environmental and recreational losses.

Hawaii is excluded from the Formula Grants, however, since eligibility is based on Outer-Continental-Shelf (OCS) oil and gas activities--activities which do not exist in Hawaiian waters. Nevertheless, Hawaii may eventually qualify for the Formula Grants if oil exploration activities on Alaska's OCS

on which

should prove successful. After production begins, it is expected that a portion of the Alaskan OCS oil will be refined here in Hawaii in expanded facilities, and a portion of this refined oil then shipped on to the mainland for use there--thus triggering Formula Grant funding. The reasons for this expectation are as follows:

- Hawaii has favorable characteristics for refining Alaskan oil, including (a) reasonable proximity to Alaska and the West Coast, (b) favorable air and water currents which greatly reduce pollution hazards, (c) facilities to unload large tankers, (d) subtropical air and waters which aid viscosity and thereby reduce pumping costs, and (e) political stability.
- Alaskan (north slope) oil is already refined here in Hawaii (about 20,000 to 30,000 barrels per day), and approximately the same amount of refined oil, unidentified as to source, is shipped to the mainland.
- The military desires added refinery capacity in Hawaii in order to have an increased supply of jet fuel and gasoline.
- Pacific Resources, Inc. has plans to expand the capacity of their Hawaii Independent Refinery, Inc. and ship the resulting excess supply of residual oil on to the mainland, and expect to use Alaskan OCS oil as it becomes available.

The anticipated expansion of refinery capacity will require accompanying facilities, an adequate infrastructure, and services whose planning should start early in conjunction with those of the affected oil companies. Also, the increased oil shipments will increase the chances for a detrimental oil spill. Furthermore, Hawaii's increased use of Alaskan oil will likely cause an extremely difficult hazardous-waste disposal problem. This may occur

because Alaskan oil found to date has been high in sulfur--which must be removed during the refining process, and then disposed of. It is estimated that it will eventually be necessary to handle at least 20 tons of sulfur per day in the Islands.

In order to qualify for the Federal CEIP Formula Grants at the earliest possible date, and identify the needed support facilities, infrastructure, and services, *there should be close monitoring of (1) Alaskan OCS oil activities and (2) plans by Hawaii refiners to expand their capacity for processing this oil.*

G. Lobbying for Expansion of the Federal Energy Impact Program

The Federal CEIP Formula Grants (Section 308(b)), discussed in the previous section, is a well-funded program with great flexibility for coping with energy-activity impacts, as long as they relate to OCS oil and gas activities. Hawaii will not be eligible for these grants until production and local refining of Alaskan OCS oil begins. }

In the meantime, considerable energy development will occur with biomass, geothermal, WECS, OTEC, and other alternative-energy resources. To cope with the impacts of these activities, the comparatively small Planning Grants (Section 308(c)) and possibly Environmental Grants (Section 308(d)(4)) are available under the Federal CEIP. However, the much larger Formula Grants are not available. To correct this over-restriction of the Formula Grants to just OCS oil and gas activities, it may be worthwhile to *lobby for either an expansion in the eligibility for the Formula Grants to include alternative-energy activities or development of an equivalent grants program.*

Such a change in the Formula Grants or introduction of a new grants program would better support national priorities of developing all domestic energy resources rather than just OCS oil and gas development. Also, this

would result in a fairer distribution of grants among the coastal states. In FY 1979, just two states--Louisiana and Alaska--were eligible for nearly \$15 million in funds, which amounted to over half of the total available. Other states--particularly some of those in New England--were granted eligibility based only on their possible exposure to distant and improbable oil spills, while other coastal states, including Hawaii and the Great Lakes states, were excluded from this program.

APPENDIX A
DESCRIPTION OF THE
COASTAL ENERGY IMPACT PROGRAM
FROM THE

1979 CATALOG OF FEDERAL DOMESTIC ASSISTANCE

<u>Programs</u>	<u>Page</u>
Planning Grants	A-1
Formula Grants	A-2
Loans and Guarantees	A-3
Environmental Grants	A-4

COASTAL ENERGY IMPACT PROGRAM— PLANNING GRANTS

FEDERAL AGENCY: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

AUTHORIZATION: Coastal Zone Management Act Amendments of 1976, Section 308(c), Public Law 94-370 (16 U.S.C. 1451 et seq.).

OBJECTIVES: To assist the states and units of local government to study and plan for the social, economic and environmental consequences on the coastal zone of new or expanded energy facilities; to encourage rational and timely planning and management of energy facility siting and energy resource development.

TYPES OF ASSISTANCE: Project Grants.

USES AND USE RESTRICTIONS: Eligible uses include: Planning projects for housing and land use planning, public safety, and public facility plans, provided they are related to the social, economic and environmental impacts resulting from new or expanded energy activity; development and implementation of an Intra-State Allocation Process; and direct administrative costs for State lead agencies of administering all 308 financial assistance programs. **JOINT FUNDING:** This program is considered suitable for joint funding with closely related Federal financial assistance programs in accordance with the provisions of OMB Circular No. A-111. For programs that are not identified as suitable for joint funding, the applicant may consult the headquarters or field office of the appropriate funding agency for further information on statutory or other restrictions involved.

ELIGIBILITY REQUIREMENTS:

Applicant Eligibility: Any coastal State or territory which has a management program which has been approved under Section 306; or is receiving a grant under Section 305(c) or (d); or is making, in the judgment of the Associate Administrator, satisfactory progress toward the development of a management program which is consistent with the policies set forth in Section 303.

Beneficiary Eligibility: Only units of general purpose local governments in the coastal zone, as defined in 15 CFR 931.22, and State agencies are eligible for CEIP assistance. The State Section 308 agency is the applicant for the grants; it may then pass through awarded assistance to local governments in accordance with the State's Intra-State Allocation Process.

Credentials/Documentation: Letter from the Governor designating the applicant. Costs will be determined in accordance with FMC 74-4.

APPLICATION AND AWARD PROCESS:

Preapplication Coordination: The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. Applications are subject to State and areawide clearinghouses review pursuant to procedures in Part I, Attachment A of OMB Circular No. A-95 (revised). No preapplication necessary. An environmental impact assessment is required for this program.

Application Procedure: The application for 308(c) planning grants, NOAA Form 36-21 is to be submitted in three copies. In each State the Governor designates a 308 Lead agency. The lead agency submits applications for financial assistance to NOAA. Projects and proposals for funding from units of local government and State agencies must be submitted to the 308 lead agency. Local governments applying to the State for assistance under the CEIP should contact the 308 lead agency for A-95 procedures as provided for in 15 CFR 931.37(b).

Award Procedure: Applications are approved by NOAA. Special Note: Intra-State Allocation Process (Section 308(g)(2)) - each coastal State, after being notified of its allotment, must establish a process to allocate its allotment among State agencies and units of local government based upon the need for assistance. Notification of awards must be made to the designated State Central Information Reception Agency in accordance with Treasury Circular 1082.

Deadlines: Applications should be submitted 60 days prior to the proposed work start date.

Range of Approval/Disapproval Time: From 20 to 30 workdays.

Appeals: No formal procedure.

Renewals: Not applicable.

ASSISTANCE CONSIDERATIONS:

Formula and Matching Requirements: The Federal share of grants for 308(c) are not to exceed 80 percent of the total project costs. Local or State funds may be used to meet the non-Federal share of project costs, or in-kind contributions may be used, as described in OMB Circular No. A-102.

Length and Time Phasing of Assistance: Grants are normally made once a year. The allotment of financial assistance among the states is based on formulas related to new or expanded energy facilities affecting the coastal zone.

POST ASSISTANCE REQUIREMENTS:

Reports: Financial status reports are required every month, and a final report within 90 days of the grant ending date.

Audits: The Assistant Administrator, the Secretary of Commerce, and the Comptroller General shall have access for the purpose of audit and examination to any records, books, documents and papers which belong to, or are used or controlled by, any recipient of the assistance or any person who entered into any transaction relating to such financial assistance under Section 308.

Records: All financial records and working papers must be retained for 3 years after the completion of the project or program for which a grant was made.

FINANCIAL INFORMATION:

Account Identification: 13-4315-0-3-452.

Obligations: (Grants) FY 78 \$3,835,000; FY 79 est \$2,730,000; and FY 80 est \$3,500,000.

Range and Average of Financial Assistance: Dependent upon State's allotment. In 1978, allotments ranged from \$16,000 to \$340,000.

PROGRAM ACCOMPLISHMENTS: Through fiscal year 1978, 76 projects were approved by NOAA, resulting in obligations of \$4,241,000 to 29 states and territories.

REGULATIONS, GUIDELINES, AND LITERATURE: 15 CFR Part 931, FMC's 74-7 and 74-4.

INFORMATION CONTACTS:

Regional or Local Office: None.

Headquarters Office: Director, Coastal Energy Impact Program Office, Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Department of Commerce, 3300 Whitehaven St., N.W., Washington, DC 20235. Telephone: (202) 634-4128.

RELATED PROGRAMS: 11.424, Coastal Energy Impact Program—Environmental Grants.

EXAMPLES OF FUNDED PROJECTS: Not presently available.

CRITERIA FOR SELECTING PROPOSALS: Not presently available.

COASTAL ENERGY IMPACT PROGRAM- FORMULA GRANTS

FEDERAL AGENCY: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

AUTHORIZATION: Coastal Zone Management Act Amendments of 1976, Section 308(b), Public Law 94-370 (16 U.S.C. 1451 Seq.); Coastal Zone Management Act Amendments of 1978, Section 308(b), P.L. 95-372.

OBJECTIVES: To provide financial assistance to coastal states to plan and construct public facilities and services and for the amelioration of environmental and recreational loss attributable to Outer Continental Shelf (OCS) energy development activities.

TYPES OF ASSISTANCE: Formula Grants.

USES AND USE RESTRICTIONS: Formula grants are available only to those states which have or have had adjacent OCS oil and gas leasing and development activities. Proceeds from these grants may be used for a very broad range of projects subject to certain priorities and prerequisites. The priority use of these grant funds is for the repayment of local and State bonds guaranteed under Section 308(d)(2) of the Act. The prerequisites of use relate to planning and development of public facilities and services. A prime use of these funds is for the protection and restoration of environmental and recreational resources. Project costs must be in line with the value of the resources. **JOINT FUNDING:** This program is considered suitable for joint funding with closely related Federal financial assistance programs in accordance with the provisions of OMB Circular No. A-111. For programs that are not identified as suitable for joint funding, the applicant may consult the headquarters or field office of the appropriate funding agency for further information on statutory or other restrictions involved.

ELIGIBILITY REQUIREMENTS:

Applicant Eligibility: Any coastal State which has a management program which has been approved under Section 306; or is receiving a grant under Sections 305(c) or (d); or is making, in the judgment of the Assistant Administrator, satisfactory progress toward the development of a management program which is consistent with the policies set forth in Section 303. The Governor shall designate the State agency or entity that is to be the applicant.

Beneficiary Eligibility: Local and regional government units may apply for assistance under this program from their designated State Section 308 agency.

Credentials/Documentation: Letter from the Governor designating the applicant. Costs will be determined in accordance with FMC 74-4.

APPLICATION AND AWARD PROCESS:

Preapplication Coordination: Only construction projects require a preapplication and an environmental impact statement. The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. Applications are subject to State and areawide clearing-houses review pursuant to procedures in Part I, Attachment A of OMB Circular No. A-95 (revised).

Application Procedure: The requisition for 308(b) formula grants, NOAA Form 36-20 is to be submitted in three copies.

Award Procedure: Requisitions are approved by NOAA. Special note: Intra-State Allocation process (Section 308(g)(2)): each coastal State, after being notified of its allotment, must establish a process to allocate its allotment among State agencies and units of local government based upon the need for assistance. Notification of awards must be made to the designated State Central Information Reception Agency in accordance with Treasury Circular 1082.

Deadlines: Requisitions should be submitted 60 days prior to proposed work start date.

Range of Approval/Disapproval Time: From 20 to 30 workdays.

Appeals: No formal procedure.

Renewals: Not applicable.

ASSISTANCE CONSIDERATIONS:

Formula and Matching Requirements: 100 percent Federal funding.

Grants are allotted to a State by means of a prescribed formula based on the State's proportional share of nation-wide OCS activities of the preceding fiscal year measured by the following weighted indices: (1) OCS acreage initially leased, 50.0 percent; (2) OCS oil and natural gas landed, 25.0 percent; (3) OCS oil and natural gas produced, 25.0 percent.

Length and Time Phasing of Assistance: Each State is allotted a specific amount of each year's appropriation by means of a formula. The proceeds of grants which are requisitioned by and disbursed to a State in any fiscal year but which are not expended or committed by the State by the end of the fiscal year in which the grant proceeds were awarded are subject to recovery and subsequent re-allotment. Grant proceeds not requisitioned remain available for award until the end of fiscal year 1988, at which time proceeds not awarded will be returned to the United States Treasury.

POST ASSISTANCE REQUIREMENTS:

Reports: Financial Status Reports, SF 269, and performance reports are required every 6 months (October-March, April-September) and final reports within 90 days of the grant ending date.

Audits: The Assistant Administrator, The Secretary of Commerce, and the Comptroller General shall have access for purposes of audit and examination to any records, books, documents, and papers which belong to, or are used or controlled by, any recipient of the assistance or any person who entered into any transaction relating to such financial assistance, which is used in accordance with Section 308.

Records: All financial records and working papers must be retained for 3 years after the completion of the project or program for which a grant was made.

FINANCIAL INFORMATION:

Account Identification: 13-1451-0-1-302.

Obligations: (Grants) FY 78 est \$13,075,000; FY 79 est \$41,323,000; and FY 80 est \$27,750,000.

Range and Average of Financial Assistance: Dependent upon State's allotment. In FY 78, allotments ranged from \$7,000 to \$14,000,000.

PROGRAM ACCOMPLISHMENTS: Through fiscal year 1978, 52 projects were approved and resulted in obligations of \$13,912,000 for 6 states.

REGULATIONS, GUIDELINES, AND LITERATURE: 15 CFR Part 931, OMB Circular No. A-102 and FMC 74-4.

INFORMATION CONTACTS:

Regional or Local Office: None.

Headquarters Office: Director, Coastal Energy Impact Program Office, Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Department of Commerce, 3300 Whitehaven St., N.W., Washington, DC 20235. Telephone: (202) 634-4128.

RELATED PROGRAMS: 11.418, Coastal Zone Management Program Development; 11.419, Coastal Zone Management Program Administration.

EXAMPLES OF FUNDED PROJECTS: Not applicable.

CRITERIA FOR SELECTING PROPOSALS: Not applicable.

COASTAL ENERGY IMPACT PROGRAM— LOANS AND GUARANTEES

FEDERAL AGENCY: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

AUTHORIZATION: Coastal Zone Management Act Amendments of 1976, Section 308(d)(1) Loans and 308(d)(2) Bond Guarantees; 16 U.S.C. 1451 et seq; Public Law 94-370.

OBJECTIVES: To provide financial assistance for public facilities necessary to support increased populations stemming from new or expanded coastal energy activity.

TYPES OF ASSISTANCE: Direct Loans.

USES AND USE RESTRICTIONS: The public facilities eligible include but are not limited to highways and secondary roads, parking, mass transit, docks, navigation aids, fire and police protection, water supply, waste collection and treatment (including drainage), schools and education, and hospitals and health care.

ELIGIBILITY REQUIREMENTS:

Applicant Eligibility: Any coastal State which has a management program which has been approved under Section 306; or is making in the judgment of the Assistant Administrator, satisfactory progress toward the development of a management program which is consistent with the policies set forth in Section 303.

Beneficiary Eligibility: Only units of general purpose local government in the coastal zone, as defined in 15 CFR 931.22, and State agencies are eligible for CEIP financial assistance.

Credentials/Documentation: Costs will be determined in accordance with FMC 74-4.

APPLICATION AND AWARD PROCESS:

Preapplication Coordination: For construction project, the borrower must provide a Preliminary Engineering Report which contains a preliminary analysis of the engineering aspects of the proposed facility costs and financial feasibility of the project. Cost for the Preliminary Engineering Report may also be included in 308(b) Applications. The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. Applications are subject to State and areawide clearinghouses review pursuant to procedures in Part I, Attachment A of OMB Circular No. A-95 (revised). An environmental impact assessment should be submitted with the initial construction project application to determine whether an environmental impact statement is required.

Application Procedure: Applications for Section 308(d)(1) and (2) NOAA Form 36-23 are to be submitted in three copies. In each State the Governor designates a 308 lead agency. The lead agency submits applications for financial assistance to NOAA. Projects and proposals for funding from units of local governments and State agencies must be submitted to the 308 lead agency. Local governments applying for credit assistance should contact the lead agency for A-95 procedures as provided for in 15 CFR 931.37 (b).

Award Procedure: Applications are approved by NOAA. Special note: Intra-State Allocation Process (Section 308(g)(2)) - each coastal State, after being notified of its allotment, must establish a process to allocate its allotment among State agencies and units of local government based upon the need and level of anticipated impact (see 15 CFR Subpart J). Notification of awards must be made to the designated State Central Information Reception Agency in accordance with Treasury Circular 1082.

Deadlines: Applications should be submitted 60 days prior to the proposed work start date.

Range of Approval/Disapproval Time: From 20 to 30 workdays.

Appeals: No formal procedure.

Renewals: Not applicable.

ASSISTANCE CONSIDERATIONS:

Formula and Matching Requirements: Up to 100 percent Federal funding.

Length and Time Phasing of Assistance: After being notified of its allotment, a coastal State may submit application for loans and guarantees from this allotment.

POST ASSISTANCE REQUIREMENTS:

Reports: Quarterly construction and financial status reports are required for all construction projects.

Audits: The Assistant Administrator, the Secretary of Commerce, and the Comptroller General shall have access for purposes of audit and examination to any records, books and documents, and papers which belong to, or are used or controlled by any recipient of the assistance or any person who entered into any transaction relating to such financial assistance under Section 308.

Records: Recipients of loans and guarantees should retain financial records until complete repayment of the loan or guarantee for a period of at least 3 years.

FINANCIAL INFORMATION:

Account Identification: 13-4315-0-3-452.

Obligations: (Loans) FY 78 \$60,897,000; FY 79 est \$28,578,000; and FY 80 est \$61,000,000.

Range and Average of Financial Assistance: Dependent upon State's allotment. In 1978, allotments ranged from \$200,000 to \$38,000,000.

PROGRAM ACCOMPLISHMENTS: Through fiscal year 1978, four loans totalling \$61,000,000 were awarded to 2 States.

REGULATIONS, GUIDELINES, AND LITERATURE: 15 CFR Part 931, FMC 74-7 and 74-4.

INFORMATION CONTACTS:

Regional or Local Office: None.

Headquarters Office: Director, Coastal Energy Impact Program Office, Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Department of Commerce, 3300 Whitehaven St., N.W., Washington, DC 20235. Telephone: (202) 634-4128.

RELATED PROGRAMS: 11.421, Coastal Energy Impact Program—Formula Grants; 11.424, Coastal Energy Impact Program—Environmental Grants.

EXAMPLES OF FUNDED PROJECTS: Not applicable.

CRITERIA FOR SELECTING PROPOSALS: Not applicable.

COASTAL ENERGY IMPACT PROGRAM— ENVIRONMENTAL GRANTS

FEDERAL AGENCY: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

AUTHORIZATION: Coastal Zone Management Act Amendments of 1976, Section 308(d)(4), Public Law 94-370 (16 U.S.C. 1451, SEQ.).

OBJECTIVES: To help states and units of local governments prevent, reduce, or ameliorate unavoidable loss of valuable environmental or recreational resources resulting from coastal energy activity, while ensuring that the person responsible for these environmental or recreational losses pays for their full cost.

TYPES OF ASSISTANCE: Project Grants.

USES AND USE RESTRICTIONS: Assistance may be used to design and implement projects to prevent and reduce or ameliorate environmental and recreational losses in the coastal zone resulting from the siting, construction, expansion, or operation of any equipment or facility required by coastal energy activity. Assistance under this Section may also be used for: administrative costs; restoration, replacement, or acquisition of environmental or recreational resources; and the cost differential between the least cost method of providing a public facility required as a result of coastal energy activity and a higher cost method that reduces the environmental loss of the least cost method. **JOINT FUNDING:** This program is considered suitable for joint funding with closely related Federal financial assistance programs in accordance with the provisions of OMB Circular No. A-111. For programs that are not identified as suitable for joint funding, the applicant may consult the headquarters or field office of the appropriate funding agency for further information on statutory or other restrictions involved.

ELIGIBILITY REQUIREMENTS:

Applicant Eligibility: Any coastal State which has a management program which has been approved under Section 306; or is receiving a grant under Sections 305(c) or (d); or is making, in the judgment of the Assistant Administrator, satisfactory progress toward the development of a management program which is consistent with the policies set forth in Section 303. In addition, to be eligible for the grants under Section 308(d)(4), a State's allotment under Section 308(b) must be insufficient.

Beneficiary Eligibility: Only the designated State lead agency may apply for and receive grants. The grants may then be passed through to units of general purpose local governments.

Credentials/Documentation: Letter from the Governor designating the applicant. Costs will be determined in accordance with FMC 74-4.

APPLICATION AND AWARD PROCESS:

Preapplication Coordination: Construction projects under Section 308(d)(4) require a preapplication and basic environmental impact assessment information to determine if an environmental statement is required. The standard application forms as furnished by the Federal agency and required by OMB Circular No. A-102 must be used for this program. Applications are subject to State and areawide clearinghouses review pursuant to procedures in Part I, Attachment A of OMB Circular No. A-95 (revised).

Application Procedure: The application for 308(d)(4) Non-Construction projects, NOAA Form 36-22 or Construction Projects, NOAA Form 36-23 is to be submitted in three copies. In each State the Governor designates a 308 lead agency. The lead agency submits applications for financial assistance to NOAA. Projects and proposals for funding from units of local government and State agencies must be submitted to the 308 lead agency for A-95 procedures as provided for in 15 CFR 931.37(b).

Award Procedure: Applications are approved by NOAA. Special Note: Intra-State Allocation Process (Section 308(g)(2)) - each coastal State, after being notified of its allotment, must establish a process to allocate its allotment among State agencies and units of local government based upon the need for assistance. See 15 CFR Subpart J. Notification of awards must be made to the designated State Central Information Reception Agency in accordance with Treasury Circular 1082.

Deadlines: Applications should be submitted 60 days prior to the proposed work start date.

Range of Approval/Disapproval Time: From 20 to 30 workdays.

Appeals: No formal procedure.

Renewals: Not applicable.

ASSISTANCE CONSIDERATIONS:

Formula and Matching Requirements: 100 percent Federal funding.

Length and Time Phasing of Assistance: Grants are normally allotted once a year. The allotment of financial assistance is based on formulas relating to Outer Continental Shelf (OCS) and other coastal energy activities.

POST ASSISTANCE REQUIREMENTS:

Reports: Quarterly construction and financial status reports are required for all construction projects. For non-construction projects, quarterly financial status reports are required.

Audits: The Assistant Administrator, the Secretary of Commerce, and the Comptroller General shall have access for purposes of audit and examination to any records, books, documents and papers which belong to, or are used or controlled by any recipient of the assistance or any person who entered into any transaction relating to such financial assistance under Section 308.

Records: All financial records and working papers must be retained for 3 years after the completion of the project or program for which the grant was made.

FINANCIAL INFORMATION:

Account Identification: 13-4315-0-3-452.

Obligations: (Grants) FY 78 \$1,045,000; FY 79 est \$1,955,000; and FY 80 est \$0.

Range and Average of Financial Assistance: Dependent upon the State's allotment. In 1978, allotments ranged from \$3,000 to \$515,000.

PROGRAM ACCOMPLISHMENTS: In fiscal year 1978, NOAA approved 31 projects totalling \$1,045,000 to 11 States.

REGULATIONS, GUIDELINES, AND LITERATURE: 15 CFR Part 931, FMC's 74-4 and 74-7.

INFORMATION CONTACTS:

Regional or Local Office: None.

Headquarters Office: Director, Coastal Energy Impact Program Office, Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Department of Commerce, 3300 Whitehaven St., N.W., Washington, DC 20235. Telephone: (202) 634-4128.

RELATED PROGRAMS: 11.421, Coastal Energy Impact Program—Formula Grants; 11.422, Coastal Energy Impact Program—Planning Grants; 11.423, Coastal Energy Impact Program—Loans and Guarantees.

EXAMPLES OF FUNDED PROJECTS: Not presently available.

CRITERIA FOR SELECTING PROPOSALS: Not presently available.

APPENDIX B

CONTACTS FOR UPDATING THE ENERGY FACILITY INVENTORY AND IMPACT ASSESSMENTS

<u>Table</u>	<u>Page</u>
1. --ANNUAL REPORTS COVERING THE STATUS OF ENERGY FACILITY DEVELOPMENTS AND AGENCY CONTACTS	B-1
2. --MILITARY ENERGY COORDINATORS	B-2
3. --OIL REFINERY CONTACTS	B-3
4. --ELECTRIC COMPANY CONTACTS	B-4
5. --SUGAR COMPANY CONTACTS	B-5
6. --ALTERNATIVE ENERGY FACILITY OPERATORS AND DEVELOPERS:	
a.--Hydropower	B-6
b.--Photovoltaic	B-7
c.--Energy Tree Farms	B-8
d.--Wind Energy Conversion Systems	B-9
e.--Geothermal	B-10
f.--Ocean Thermal Energy Conversion	B-11
g.--Energy Recovery Systems	B-12
h.--Ethanol	B-13
7. --CEMENT COMPANY CONTACTS FOR COAL HANDLING	B-14
8. --CONTACTS FOR ENERGY TRANSPORTATION AND STORAGE	B-15
9. --REVIEWERS OF IMPACTS AND MITIGATING MEASURES	B-16
10. --GENERAL REVIEWERS OF ENERGY ACTIVITIES	B-17

TABLE B-1.--ANNUAL REPORTS COVERING THE STATUS OF ENERGY
FACILITY DEVELOPMENTS AND AGENCY CONTACTS

<u>Coverage/Annual Reports</u>	<u>Agency Contact, Address</u>	<u>Phone</u>
Electric Utilities--Existing Facilities:		
Annual reports of electric Companies on file with the Department of Regulatory Agencies.	Roy Terada, Chief Engineer Teruo Yoshida, Chief Statistician Department of Regulatory Agencies 1010 Richards Street Honolulu, HI 96813	548-2566 548-2539
Electric Utilities--Existing and Planned Facilities:		
<u>Inventory of Power Plants in the United States, U.S. Department of Energy, Washington, D.C.</u>	-	-
Alternative Energy--Existing and Planned Activities:		
<u>Energy Resources Coordinator Annual Report, Department of Planning and Economic Development, Honolulu, Hawaii.</u>	Dr. Eugene M. Grabbe Center for Science Policy and Technology Assessment Department of Planning and Economic Development 250 S. King Street Honolulu, HI 96813	948-4195
<u>Hawaii Natural Energy Institute Annual Report, University of Hawaii, Honolulu, Hawaii.</u>	Dr. Paul Yuen Dr. Richard Neill Hawaii Natural Energy Institute Holmes Hall, Room 246 University of Hawaii 2540 Dole Street Honolulu, HI 96822	948-7886 948-6947 948-8890
Sugar Companies--Existing Facilities:		
<u>Factory Equipment, Hawaiian Sugar Planters' Association, Honolulu, Hawaii.</u>	-	-

TABLE B-2.--MILITARY ENERGY COORDINATORS

<u>Service</u>	<u>Contact Address</u>	<u>Phone</u>	<u>Areas of Specific Interest</u>
Air Force:			
	Captain John Heiser	449-2158	-
	15th ABW/DEEV	-1361	
	Hickam AFB, HI 96853	-1662	
Army:			
	Colonel William G. Gustafson	438-1766	-
	UQ U.S. Army Western Command		
	Attn: APLG-TR		
	Ft. Shafter, HI 96858		
Marine Corps:			
	Mr. Wallace Nakahara	257-3675	wind energy conversion
	Public Works Department		systems
	Marine Corps Air Station		
	Kaneohe Bay, HI 96863		
Navy:			
	LCDR Clayton Y. K. Ching	471-0384	-
	Navy Public Works Center		
	Pearl Harbor, HI 96860		

TABLE B-3.--OIL REFINERY CONTACTS

Areas of General Interest:

Crude oil refining and associated transportation and storage of oil products.

<u>Company</u>	<u>Contact Address</u>	<u>Phone</u>	<u>Areas of Additional Interest</u>
----------------	------------------------	--------------	-------------------------------------

Chevron:

William Dunn Chevron Refinery P.O. Box 29789 Honolulu, HI 96820	682-5711 ext. 15	-
--	---------------------	---

Pacific Resources, Inc.:

Francis Tanaka Pacific Resources, Inc. P.O. Box 3379 Honolulu, HI 96842	548-4286	alcohol for producing Gasahol
--	----------	-------------------------------

TABLE B-4.--ELECTRIC COMPANY CONTACTS
(including Dole Co. on Lanai)

Areas of General Interest:

- Steam generators fueled with oil, biomass, or trash; gas turbine generators; and internal combustion (diesel) generators.
- Oil storage.
- Electrical energy transmission.

<u>Company</u>	<u>Contact Address</u>	<u>Phone</u>	<u>Areas of Additional Interest</u>
Hawaiian Electric Co., Hawaiian Electric Light Co., and Maui Electric Co.:			
	Dr. John M. Cain	548-6880	--wind energy conversion systems
	Richard Bell	548-7771	--ocean thermal energy conversion
	Chipman Higgings	548-7771	--hydropower
	Hawaiian Electric Co. P.O. Box 2750 Honolulu, HI 96804		
Citizens Utilities Co., Kauai Electric Division:			
	Kelvin Kai	335-3131	-
	Citizens Utilities Co. Kauai Electric Division P.O. Box 278 Eleele, HI 96705		
Molokai Electric:			
	Bruce Yamashita	553-3234	--wind energy conversion systems
	Molokai Electric Co. P.O. Box 379 Kuanakakai, HI 96848		
Dole Co.:			
	Tomo Mitsanaga	531-4434	-
	650 Iwilei Road Honolulu, HI 96817		

TABLE B-5.--SUGAR COMPANY CONTACTS

Areas of General Interest:

Steam generators fueled with bagasse and possibly oil, sugarcane trash, municipal trash, wood chips, energy pellets, and macadamia nut shells.

<u>Company</u>	<u>Contact Address</u>	<u>Phone</u>	<u>Areas of Additional Interest</u>
Alexander and Baldwin:			
	Sach Masumoto Alexander and Baldwin 822 Bishop Street Honolulu, HI 96813	525-6607	--hydropower --ethanol
Amfac, Inc.:			
	George St. John Amfac, Inc. 700 Bishop Street Honolulu, HI 96813	945-8154	--hydropower
C. Brewer and Co., Ltd.:			
	Jerry Allen C. Brewer and Co., Ltd. 827 Fort Street Honolulu, HI 96813	544-6100	--hydropower --energy tree farms
Castle and Cooke:			
	Sudami Tanaka Tyrus Chang Waialua Sugar Co., Inc. Waialua, HI 96791	637-4280 637-4428	-
Theo H. Davies and Co., Ltd.:			
	Garvie Hall Theo H. Davies and Co., Ltd. 841 Bishop Street Honolulu, HI 96813	531-8531	--hydropower --bagasse energy pellets

TABLE B-6a.--ALTERNATIVE ENERGY FACILITY OPERATORS
AND DEVELOPERS: HYDROPOWER

<u>Company/Agency</u>	<u>Contact Address</u>	<u>Phone</u>
Sugar Companies:	See Table B-5.	See Table B-5.
Alexander and Baldwin		
Amfac, Inc.		
C. Brewer & Co., Ltd.		
Theo H. Davies & Co., Ltd.		
Hawaii Electric Light Co.	See Table B-4.	See Table B-4.
Department of Land and Natural Resources	Robert Chuck Department of Land and Natural Resources 1151 Punchbowl Street Honolulu, HI 96813	548-7533

TABLE B-6b.--ALTERNATIVE ENERGY FACILITY OPERATORS
AND DEVELOPERS: PHOTOVOLTAIC

<u>Project</u>	<u>Contact Address</u>	<u>Phone</u>
Kauai Wilcox Hospital Photovoltaic Project	Kenneth Ono PX 3420 Kuhio Highway Lihue, HI 96766	245-4811

TABLE B-6c.--ALTERNATIVE ENERGY FACILITY OPERATORS
AND DEVELOPERS: ENERGY TREE FARM

<u>Company/Agency</u>	<u>Contact Address</u>	<u>Phone</u>
C. Brewer & Co., Ltd.	See Table B-5.	See Table B-5.
Department of Land and Natural Resources	Libert K. Landgraf Department of Land and Natural Resources 1151 Punchbowl Street Honolulu, HI 96813	548-2861

TABLE B-6d.--ALTERNATIVE ENERGY FACILITY OPERATORS AND DEVELOPERS:
WIND ENERGY CONVERSION SYSTEMS

<u>Company/Agency</u>	<u>Contact Address</u>	<u>Phone</u>
Hawaiian Electric Co.	See Table B-4.	See Table B-4.
Marine Corps	See Table B-2.	See Table B-2.
Davis Farm	Bucky Davis Davis Farm Hoolehua, Molokai, HI 96729	
Kahua Ranch	Monte Richards Kahua Ranch P.O. Box 837 Kamuela, HI 96743	889-6464
Kahuku Fish Farm	Tap Pryor Systems Culture Corporation 828 Fort Street Mall Honolulu, HI 96813	524-6165

TABLE B-6e.--ALTERNATIVE ENERGY FACILITY OPERATORS
AND DEVELOPERS: GEOTHERMAL

<u>Project/Activity</u>	<u>Contact Address</u>	<u>Phone</u>
Hawaii Geothermal Research Station	Louis Lopez HGP-A Well Head Generator Feasibility Study Varsity Building, Room 411 1110 University Avenue Honolulu, HI 96826	948-6920
Pahoa Geothermal Industrial Park	Lloyd Jones Hawaiian Dredging and Construction Company 614 Kapahulu Honolulu, HI 96815	735-3211
Geothermal Drilling	Dr. Charles Helsley Hawaii Institute of Geophysics University of Hawaii 2525 Correa Road Honolulu, HI 96822	948-8760

TABLE B-6f.--ALTERNATIVE ENERGY FACILITY OPERATORS AND DEVELOPERS:
OCEAN THERMAL ENERGY CONVERSION

<u>Project/Activity</u>	<u>Contact Address</u>	<u>Phone</u>
Seacoast Test Facility	Dr. Larry Hallanger Seacoast Test Facility College of Engineering University of Hawaii 2450 Dole Street Honolulu, HI 96822	948-6947
Mini OTEC	Hank White Jeff Moore N.E.L.H. 74-5563 Q Kaiwi Kailua-Kona, HI 96740	329-9357
OTEC-1	Robert Dickieson Global Marine, Suite 211 126 Queen Street Honolulu, HI 96813	523-3001 239-7339 (Hm)
	George W. Phillips, Jr. Nick Hazelwood	(714) 752-5050
OTEC Related Aquaculture Development	Dr. John Craven Marine Affairs Coordinator 1164 Bishop Honolulu, HI 96813	548-6262

TABLE B-6g.--ALTERNATIVE ENERGY FACILITY OPERATORS AND DEVELOPERS:
ENERGY RECOVERY PROJECTS¹

<u>Project</u>	<u>Contact Address</u>	<u>Phone</u>
H-POWER	Thomas Vendetta Department of Public Works City and County of Honolulu 650 South King Street Honolulu, HI 96813	523-4774
Recycled Oil	Warren Roslusney Energy Recovery Systems 228 Mohonua Place Honolulu, HI 96819	531-0182

¹Excludes sugar operations, some of which burn municipal trash.

TABLE B-6h.--ALTERNATIVE ENERGY FACILITY OPERATORS
AND DEVELOPERS: ETHANOL

<u>Company</u>	<u>Contact Address</u>	<u>Phone</u>
Alexander and Baldwin, Inc.	See Table B-5.	See Table B-5.
Del Monte Corporation	Mr. Johnson 500 Sumner Street Honolulu, HI 96817	537-5321

TABLE B-7.--CEMENT COMPANY CONTACTS FOR COAL HANDLING

<u>Company</u>	<u>Contact Address</u>	<u>Phone</u>
Cyprus Hawaiian Cement Corp.	Fred B. Smates 700 Bishop Street, Suite 610 Honolulu, HI 96813	524-6926
Kaiser Cement & Gypsum	R. H. Berby Kaiser Cement Corp. Kaiser Building, Rm 2554 300 Lakeside Drive Oakland, CA 94612	(415) 271-2123

TABLE B-8.--CONTACTS FOR ENERGY TRANSPORTATION AND STORAGE

<u>Company/Agency/Activity</u>	<u>Contact Address</u>	<u>Phone</u>
Oil Refineries	See Table B-3.	See Table B-3.
State Department of Transportation:		
Harbors	Kelvin Tsuda or Joe Amaki	548-2559
Oahu Energy Corridor	Tom Fujikawa	548-2505
	Department of Transportation 869 Punchbowl Street Honolulu, HI 96813	
State Energy Office:		
Strategic Petroleum Storage	Alfred S. Harris State Energy Office Department of Planning and Economic Development 250 South King Street Honolulu, HI 96813	548-4150

TABLE B-9.--REVIEWERS OF IMPACTS AND MITIGATING MEASURES

<u>Institution</u>	<u>Contact Address</u>	<u>Phone</u>
Office of Environmental Quality Control	Richard O'Connell Office of Environmental Quality Control 550 Halekauwila Honolulu, HI 96813	548-6915
Department of Health Environmental Protection and Health Services Division	Dr. James S. Kumagai Department of Health 1250 Punchbowl Street Honolulu, HI 96813	548-4139
Life of the Land	Doug Meller Life of the Land Room 209 404 Piikoi Honolulu, HI 96814	521-1300

TABLE B-10.--GENERAL REVIEWERS OF ENERGY ACTIVITIES

<u>Institution</u>	<u>Contact Address</u>	<u>Phone</u>	<u>Areas of General Interest</u>
Department of Planning and Economic Development:			
State Energy Office:			
	See Table B-7.	See Table B-7.	--energy allocation and conservation --strategic petroleum storage
Center for Science Policy and Technology Assessment:			
	See Table B-1. (Dr. Eugene M. Grabbe)	See Table B-1.	---alternative energy development --energy conservation
University of Hawaii:			
Hawaii Natural Energy Institute:			
	See Table B-1. (Dr. Paul Yuen)	See Table B-1.	--alternative energy development --energy conservation
College of Engineering:			
	Dean John W. Shupe College of Engineering Holmes Hall, Rm 240 University of Hawaii 2540 Dole Street Honolulu, HI 96822	948-7727	--alternative energy development --energy conservation
County Governments:			
Hawaii:			
	John P. Keppler County of Hawaii 25 Aupuni Street Hilo, HI 96720	961-8211	--alternative energy development --energy conservation

TABLE B-10 (continued)

<u>Institution</u>	<u>Contact Address</u>	<u>Phone</u>	<u>Areas of General Interest</u>
County Governments (continued):			
Honolulu:			
	Chew Lun Lau City and County of Honolulu Department of Public Works 650 South King Street Honolulu, HI 96813	523-4150	--alternative energy development --energy conservation
Kauai:			
	See Table B-4. (Kelvin Kai)	See Table B-4.	--alternative energy development --energy conservation
Maui:			
	Ralph Masuda County Planning Department County Office Building 200 South High Street Wailuku, HI 96793	244-7723	--alternative energy development --energy conservation

APPENDIX C

INVENTORY OF ENERGY FACILITIES: EXISTING AND PLANNED

<u>Table</u>	<u>Page</u>
1.--OIL REFINERY AND SYNTHETIC NATURAL GAS PLANTS	C-1
2.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS (including Dole Co. on Lanai)	C-2
3.--SUGAR COMPANY BIOMASS AND OIL-FUELED GENERATING PLANTS	C-11
4.--HYDROELECTRIC PLANTS	C-17
5.--DIRECT SOLAR ENERGY FACILITIES	C-21
6.--ENERGY TREE FARMS	C-25
7.--WIND ENERGY CONVERSION SYSTEMS (WECS)	C-29
8.--GEOTHERMAL FACILITIES AND ACTIVITIES	C-32
9.--ENERGY RESEARCH FACILITIES AT THE NATURAL ENERGY LABORATORY OF HAWAII, KE-AHOLE POINT, HAWAII	C-35
10.--OCEAN THERMAL ENERGY CONVERSIONS (OTEC) FACILITIES	C-36
11.--ETHANOL PRODUCTION FACILITIES	C-38
12.--MUNICIPAL SOLID-WASTE-FUELED ENERGY FACILITIES	C-40
13.--OIL RECOVERY FACILITIES	C-41
14.--PETROLEUM AND ALCOHOL STORAGE TANKS	C-42
15.--OAHU ENERGY CORRIDOR	C-47
16.--COAL HANDLING FACILITIES OF CEMENT COMPANIES	C-48
17.--OFFSHORE MOORING AND PIPELINE FACILITIES FOR TRANSFERRING OIL PRODUCTS	C-49
18.--BARBERS POINT HARBOR FACILITIES FOR HANDLING PETROLEUM PRODUCTS	C-50
19.--PIERS WITH FACILITIES FOR HANDLING OIL	C-51

APPENDIX C

INVENTORY OF ENERGY FACILITIES: EXISTING AND PLANNED

<u>Table</u>	<u>Page</u>
1.--OIL REFINERY AND SYNTHETIC NATURAL GAS PLANTS	C-1
2.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS (including Dole Co. on Lanai)	C-2
3.--SUGAR COMPANY BIOMASS AND OIL-FUELED GENERATING PLANTS	C-11
4.--HYDROELECTRIC PLANTS	C-17
5.--DIRECT SOLAR ENERGY FACILITIES	C-21
6.--ENERGY TREE FARMS	C-25
7.--WIND ENERGY CONVERSION SYSTEMS (WECS)	C-29
8.--GEOTHERMAL FACILITIES AND ACTIVITIES	C-32
9.--ENERGY RESEARCH FACILITIES AT THE NATURAL ENERGY LABORATORY OF HAWAII, KE-AHOLE POINT, HAWAII	C-35
10.--OCEAN THERMAL ENERGY CONVERSIONS (OTEC) FACILITIES	C-36
11.--ETHANOL PRODUCTION FACILITIES	C-38
12.--MUNICIPAL SOLID-WASTE-FUELED ENERGY FACILITIES	C-40
13.--OIL RECOVERY FACILITIES	C-41
14.--PETROLEUM AND ALCOHOL STORAGE TANKS	C-42
15.--OAHU ENERGY CORRIDOR	C-47
16.--COAL HANDLING FACILITIES OF CEMENT COMPANIES	C-48
17.--OFFSHORE MOORING AND PIPELINE FACILITIES FOR TRANSFERRING OIL PRODUCTS	C-49
18.--BARBERS POINT HARBOR FACILITIES FOR HANDLING PETROLEUM PRODUCTS	C-50
19.--PIERS WITH FACILITIES FOR HANDLING OIL	C-51

TABLE C-1.--OIL REFINERY AND SYNTHETIC NATURAL GAS PLANTS

County: Honolulu

Location: Campbell Industrial Park

Plants	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Chevron Refinery:				
Existing plant	44,000 barrels per day			
Plants of Pacific Resources, Inc.:				
Hawaii Independent Refinery, Inc.:				
Existing plant	60,000 barrels per day			
Committed for construction:				
Hydrocracking unit ...	13,000 barrels per day	2	600	Construction period: 6/1980 to 1982 EIS: Not required. Federal permit: Application made for EPA air quality permit. State permit: No application has yet been made for DOH authority to construct.
Expansion	72,000 barrels per day	1	400	Construction period: 1980 to 1982 EIS: Final draft completed. Federal permit: Approved EPA air quality permit. State permit: No application has yet been made for DOH authority to construct.
Enerco, Inc.:				
Existing plant	9 MMCF per day		-	Comment: Synthetic natural gas plant.

TABLE C-2a.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS

Company: Hawaiian Electric Co. (HECO)

County: Honolulu

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construction	
Honolulu Plant:					
Existing generators	4 steam turbines	180	182	-	-
Waiau Plant:					
Existing generators	8 steam turbines 2 gas turbines	532.4	223	-	-
Kahe Plant:					
Existing generators	5 steam turbines	497	193	-	-
Under construction:					
Generator #6 ...	1 steam turbine	141	-	220	Construction period: 1979 to 1980 EIS: Not required. Federal permits: Approved EPA air quality permit. State permit: Approved DOH authority to construct.
Modification to reduce air pollution	-	-	-	41	Comment: The modification includes a higher exhaust stack and conversion of the plant to allow use of low-sulfur fuel. Construction period: 1979 to 1980 Federal permit: Approved EPA air quality permit. State permit: Approved DOH authority to construct.

TABLE C-2a. (continued)

Company: HECO
County: Honolulu

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Kahe Plant (continued): Planned:					For these generators, no EIS has been written, and no applications made for major Federal or State permits.
Generator #C-1..	1 gas turbine	70	-	81	Completion Date: 1986
Generator #C-2..	1 gas turbine	69	?	?	Completion Date: 1989
Generator #C-3..	1 gas turbine	70	?	?	Completion Date: 1991
Generator #7 ...	1 steam turbine	170	?	?	Completion Date: 1998
Generator #C-4..	1 gas turbine				

TABLE C-2b.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS

Company: Hawaii Electric Light Co. (HELCO)
 County: Hawaii

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Puueo Plant: Existing generators	3 internal combus- tion	3	0	-	-
Waiau Plant: Existing generators	-	-	-	-	No oil-fueled generators.
Waimea Plant: Existing generators	6 internal combus- tion	11.25	1	-	-
Shipman Plant: Existing generators	4 steam turbines	23.9	35	-	-
W. H. Hill Plant: Existing generators	2 steam turbines	37.8	33	-	-
Kanoehua Plant: Existing generators	4 internal combus- tion 1 gas turbine	20.85	11	-	-

TABLE C-2b. (continued)

Company: HELCO
County: Hawaii

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Keahole Plant:					
Existing generators	2 internal combus- tion	5.5	0	-	-
Planned:					For these generators, no EIS has been written, and no applications made for major Federal or State permits.
Generator #XA ..	1 internal combus- tion	2.75	-	8	Completion Date: 1984
Generator #EA	1 internal combus- tion	13.75	?	?	Completion Date: 1985
Generator #EB ..	1 internal combus- tion	13.75	?	?	Completion Date: 1989
Generator #EC ..	1 internal combus- tion	13.75	?	?	Completion Date: 1992
Generator #ED ..	1 internal combus- tion	13.75	?	?	Completion Date: 1995
Generator #EE ..	1 internal combus- tion	13.75	?	?	Completion Date: 1997

TABLE C-2c.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS

Company: Kauai Electric Co. of Citizens Utility Co.

County: Kauai

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Port Allen Plant: Existing generators	1 steam turbine 5 internal combustion 2 gas turbines 1 heat recovery system	70.58 (62.08 usable)	90	-	Comment: An additional 12 MW of power will be provided by a steam generator now under construction at the Lihue Plantation Co.

TABLE C-2d.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS

Company: Maui Electric Co. (MECO)

County: Maui

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construction	
Kahului Plant:					
Existing generators	4 steam turbines	40	39	-	-
Maalaea Plant:					
Existing generators	9 internal combustion	29.9	25	-	
Under construction:					
Generator #10 ..	1 internal combustion	13.75	8	25	Construction period: 1979 to 12/1979 EIS: Not required. Federal permit: Approved EPA air quality permit. State permit: Approved DOH authority to construct.
Committed for construction:					
Generator #11 ..	1 internal combustion	13.75	1	25	Construction period: 1980 to 12/1980 EIS: Not required. Permits: Same as for Generator #10.
Planned:					
Generator #12 ..	1 internal combustion	13.75	-	25	For these generators, no EIS has been written, and no applications made for major Federal or State permits. Completion Date: 1982
Generator #13 ..	1 internal combustion	13.75	-	25	Completion Date: 1983

TABLE C-2d. (continued)

Company: MECO

County: Maui

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Unspecified Location: Planned:					For these generators, no EIS has been written, and no applications made for major Federal or State permits.
Generator #E ...	1 internal combus- tion	about 13	?	?	Completion Date: 1984
Generator #F ...	"	"	?	?	Completion Date: 1987
Generator #G ...	"	"	?	?	Completion Date: 1987
Generator #H ...	"	"	?	?	Completion Date: 1987
Generator #I ...	"	"	?	?	Completion Date: 1988
Generator #J ...	"	"	?	?	Completion Date: 1989
Generator #K ...	"	"	?	?	Completion Date: 1990
Generator #L ...	"	"	?	?	Completion Date: 1991
Generator #M ...	"	"	?	?	Completion Date: 1991
Generator #N ...	"	"	?	?	Completion Date: 1992
Generator #O ...	"	"	?	?	Completion Date: 1993
Generator #P ...	"	"	?	?	Completion Date: 1993
Generator #Q ...	"	"	?	?	Completion Date: 1994
Generator #R ...	"	"	?	?	Completion Date: 1995
Generator #S ...	"	"	?	?	Completion Date: 1995
Generator #T ...	"	"	?	?	Completion Date: 1996
Generator #U ...	"	"	?	?	Completion Date: 1996
Generator #V ...	"	"	?	?	Completion Date: 1997
Generator #W ...	"	"	?	?	Completion Date: 1997
Generator #X ...	"	"	?	?	Completion Date: 1997
Generator #Y ...	"	"	?	?	Completion Date: 1998
Generator #Z ...	"	"	?	?	Completion Date: 1998

TABLE C-2e.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS

Company: Molokai Electric Co.
County: Maui

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construction	
Kaunakakai Plant: Existing generators	10 internal combustion	8.6	30	-	
Palaau Plant: Relocation of plant	-	-	-	30	Comment: A moving of the plant from Kaunakakai to Palaau is planned. Period: 6/1980 to 12/1985 State permit: Application has been made to the Public Utilities Commission for permission to move.
Committed for construction: Gas/biomass generators	1 gas turbine 1 steam turbine 1 heat recovery system	3	5	30	Comment: Biomass as well as oil will be used to fuel the steam generator. Construction period: 10/1980 to 1982 EIS: Not required. Permits: Federal EPA and State DOH air quality permits may be required.

TABLE C-2f.--OIL-FUELED ELECTRIC GENERATING PLANTS SUPPLYING
POWER TO AN ELECTRIC COMPANY

Company: Dole Co. of Castle and Cooke
 County: Maui

Power Plants and Generators	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Lanai Diesel Plant: Existing generators	4 diesel genera- tors	3.8			About two-thirds of the electric power generated is sold to Maui Electric Co.

TABLE C-3a.---SUGAR COMPANY BIOMASS AND OIL-FUELED
GENERATING PLANTS ON OAHU

County: City and County of Honolulu

Factory/Mill	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Amfac, Inc: Oahu Sugar Co., Ltd.:					
Existing generators	2 steam	17.5		-	
Castle and Cooke: Waialua Sugar Co., Ltd.:					
Existing generators	2 steam	12		-	In addition to bagasse, fibrous trash is also used to fuel the boiler.

TABLE C-3b.--SUGAR COMPANY BIOMASS AND OIL-FUELED
GENERATING PLANTS ON HAWAII

County: Hawaii County

Factory/Mill	Number of Type of Generator	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Amfac, Inc.: Puna Sugar Co.: Existing generators	5 steam	15			In addition to bagasse, fibrous trash is also used to fuel the boiler. A major portion of the electrical power generated is sold to Hawaii Electric Light Co.
C. Brewer and Co., Ltd.: Hilo Coast Processing Co.: Existing generators	3 steam	24			In addition to bagasse, boiler fuel includes fuel oil, wood chips, and nut shells. A major portion of the electrical power generated is sold to Hawaii Electric Light Co.
Kau Sugar Co., Ltd.: Existing generators	1 steam 1 diesel	3 0.65			

TABLE C-3b. (continued)

County: Hawaii County

Factory/Mill	Number of Type of Generator	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Theo H. Davies and Co., Ltd: Davies Hamakua Sugar Co.: Existing generators Under construction ¹ ..	3 steam 2 steam	12.5 MW 11.5 MW	 10	- 25	Construction period: 1979 to 1981 EIS: Not required. Federal permits: None required. State permits: Approval of DOH authority to construct (air quality).
Committed for construction: Woodex Plant ²	-	15,000 tons of pellets per year	3	16	Comment: Bagasse energy pellets will be produced for fueling the boilers for the steam generators. Construction period: 1/1980 to 7/1980 EIS: Not required. Federal permits: None required. State permits: None required.

¹One 4 MW generator will be at the Ookala Factory at Laupahoehoe, and one 7 MW generator will be at the Hina Factory at Honokaa.

²The Woodex Plant will be located at the Hina Factory at Honokaa.

TABLE C-3c.--SUGAR COMPANY BIOMASS AND OIL-FUELED
GENERATING PLANTS ON KAUAI

County: Kauai County

Factory/Mill	Number of Type of Generator	Capacity	Peak Employment		Status and Comments
			Operating	Construc- tion	
Alexander and Baldwin: McBryde Sugar Co., Ltd.: Existing generators	2 steam	15.5 MW (7.75 usable)			A major portion of the elec- trical power generated is sold to Kauai Electric Co.
Committed for construction: Trash dryer ..	-	16 tons per hour	-	20	Construction period: 8/1980 to 1/1981 EIS: Not required. Federal permits: None required. State permits: None required.
Amfac, Inc.: The Lihue Plantation Co.: Existing generators	3 steam	10 MW		-	A major portion of the elec- trical power generated is sold to Kauai Electric Co.
Under construction ...	1 steam	21.75 MW	15	50	This new generator will be fueled with bagasse, sugar- cane trash, wood chips, and municipal trash. A major portion of the power gener- ated will be sold to Kauai Electric Co. Construction period: 1/1979 to 8/1980 EIS: Not required. Federal permit: Approval of EPA air quality permit. State permit: Approval of DOH authority to construct (air quality).

TABLE C-3c. (continued)

County: Kauai County

Factory/Mill	Number of Type of Generator	Capacity	Peak Employment		Status and Comments
			Operating	Construc- tion	
Amfac, Inc. (continued): Kekaha Sugar Co., Ltd. Existing generators	3 steam	6.5 MW			A major portion of the elec- trical power generated is sold to Kauai Electric Co.
C. Brewer and Co., Ltd.: Olokele Sugar Co., Ltd. Existing generators	2 steam 1 diesel	2.75 MW (2 usable) 0.9 MW			

TABLE C-3d.--SUGAR COMPANY BIOBASS AND OIL-FUELED
GENERATING PLANTS ON MAUI

County: Maui County

Factory/Mill	Number of Type of Generator	Capacity	Peak Employment		Status and Comments
			Operating	Construc- tion	
Alexander and Baldwin:					
Hawaiian Commercial and Sugar Co.:					
Existing generators	5	34 MW		-	In addition to bagasse, wood chips are also used to fuel the boiler.
Committed for construction:					
Steam generator ¹ ...	1	12.5 MW	-	20	Construction period: 12/1979 to 2/1982 EIS: Not required. Federal permits: None required. State permits: None required.
Bagasse dryer ²	-	50 tons per hour	-	20	Construction period: 5/1980 to 12/1980 EIS: Not required. Federal permits: None required. State permits: None required.
Amfac, Inc.:					
Pioneer Mill Co., Ltd.:					
Existing generators	3	13.5 MW			

¹Located at the Puuue Factory.²Located at Paia Factory.

TABLE C-4a.--HYDROELECTRIC POWER ON HAWAII

County: Hawaii County

Company and Hydropower Generators	Stream or Location	Capacity (MW)	Status and Comments
Theo H. Davies and Co., Ltd.: Davies Hamakua Sugar Co.: Hira Factory, existing hydrogenerators: #1	Lower Hamakua Ditch	0.8	
Hawaii Electric Light Co.: Existing hydrogenerators: #1 Puueo	Wailuku Stream	1.5	
#2 Puueo	Wailuku Stream	0.75	
#1 Waiau	Wailuku Stream	0.75	
#2 Waiau	Wailuku Stream	0.35	

TABLE C-4b.--HYDROELECTRIC POWER ON KAUAI

County: Kauai County

Company and Hydropower Generators	Stream or Location	Capacity (MW)	Status and Comments
Alexander and Baldwin: McBride Sugar Co., Ltd.: Existing hydrogenerators:			
#A	Wainiha Stream	1.8	
#B	Wainiha Stream	1.8	
#1 Kalaheo	Alexander Reservoir	1.0	
Malumalu Hydrogenerator	Waiha- hana Stream	0.26	
Amfac, Inc.: Kekaha Sugar Co., Ltd.: Existing hydrogenerators:			
#3	Waimea Stream	1.0 (0.75 usable)	
#4	Waimea Stream	0.5 (0.35 usable)	
Lihue Plantation Co.: Existing hydrogenerators:			
#1 Upper Waiahi	North Wailua and Illiuliula Ditches	0.5	
#2 Lower Waiahi	North Wailua and Illiuliula Ditches	0.8	

TABLE C-4b. (continued)

County: Kauai County

Company and Hydropower Generators	Stream or Location	Capacity (MW)	Status and Comments
C. Brewer and Co., Ltd.: Olokele Sugar Co.: #1 Nonopahu Hydrogenerator: Existing Planned Expansion	Makaweli Stream Makaweli Stream	0.5 1.0	The expansion from 0.5 MW to 1.5 MW is planned for 1981 completion.

TABLE C-4c.--HYDROELECTRIC PLANTS ON MAUI AND MOLOKAI

County: Maui County

Company or Agency and Hydrogenerators	Stream or Location	Capacity (MW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Alexander and Baldwin: Hawaiian Commercial and Sugar Co.:					
Existing hydrogenerators:					
#1 Paia	Wailea Ditch	0.8			
#1 Keheka	Wailea Ditch	1.33			
#2 Keheka	Wailea Ditch	1.33			
#3 Keheka	Wailea Ditch	1.33			
Committed for construction:					
Hamakua Hydroplant	Makawao	0.5	-	20	Construction period: 1/1980 to 1981 EIS: Draft prepared. Federal permits: Application to be made to the Federal Energy Regulation Commission. State permit: Application to be made to the DLNR.
Department of Land and Natural Resources:					
Proposed Kualapuu Generator	Kualapuu Reservoir	1.5			Proposed system consisting of a hydrogenerator, a second pond below Kualapuu Pond, and a windmill to pump water from the lower pond back to Kualapuu Pond.

TABLE C-5a.--DIRECT SOLAR ENERGY FACILITIES ON OAHU

County: City and County of Honolulu

Activity	Peak Employment		Status and Comments
	Operating	Construction	
Under construction: Solar hot-water heaters in homes and apartments	-	485	Construction period: Ongoing EIS: Not required. Federal permits: None required. State permits: None required.

TABLE C-5b.---DIRECT SOLAR ENERGY FACILITIES ON HAWAII

County: Hawaii County

Activity/Project	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Under construction: Solar hot-water heaters in homes and apartments ..		-	89	Construction period: Ongoing EIS: Not required. Federal permits: None required. State permits: None required.
Proposed: Focusing solar collector for Hilo Coast Processing Co. of C. Brewer and Co.	3 acres	1	6	Proposed focusing solar collectors for producing steam, with 1980 completion.

TABLE C-5c.--DIRECT SOLAR ENERGY FACILITIES ON KAUAI

County: Kauai County

Activity/Project	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Under construction:				
Solar hot-water heaters in homes and apartments ..		-	32	Construction period: Ongoing EIS: Not required. Federal permits: None required. State permits: None required.
Kauai Wilcox Hospital photovoltaic system	85 kw	2	9	Construction period: 1/1980 to 12/1980 EIS: Not required. Federal permits: None required. State permits: Application made for Health Certificate of Need.

TABLE C-5d.--DIRECT SOLAR FACILITIES ON MAUI

County: Maui County

Activity	Peak Employment		Status and Comments
	Operating	Construction	
Under construction: Solar hot-water heaters in homes and apartments	-	73	Construction period: Ongoing EIS: Not required. Federal permits: None required. State permits: None required.

TABLE C-6a.--ENERGY TREE FARMS ON OAHU

County: City and County of Honolulu

Agency	Nearest Town	Acreage	Peak Employment		Status and Comments
			Operating	Construction	
Department of Land and Natural Resources, Forestry Division: Farm under development	Waialua	500	5	-	Planting period: 1977 to 1987 EIS: Not required. Federal permits: None required. State permits: Approval of Agricultural Districting by the LUC or Conservation Use Permit by the DLNR.

TABLE C-6b.--ENERGY TREE FARMS ON HAWAII

County: Hawaii County

Agency or Company	Nearest Town	Acreage	Peak Employment		Status and Comments
			Operating	Construction	
Department of Land and Natural Resources, Forestry Division: Farm under development	Honokaa and Hilo	7,270	12	-	Planting period: 1977 to 1987 EIS: Not required. Federal permits: None required. State permits: Approval of Agricultural Districting by the LUC or Conservation Use Permit by the DLNR.
Bioenergy Development Corp. of C. Brewer and Co., Ltd: Farm under development	Hilo and Kau	850	14	-	Cooperating in this project are the U.S. Forestry Services Institute of the Pacific Islands Forestry and Hilo Coast Processing Co. Planting period: 1979 to 1984 EIS: Final draft completed. Federal permits: None required. State permits: Approval of Agricultural Districting by the LUC.
Planned storage facility for wood chips	Hilo	-	2	8	Construction period: 1980

TABLE C-6c.--ENERGY TREE FARMS ON KAUAI

County: Kauai County

Agency	Nearest Town	Acreage	Peak Employment		Status and Comments
			Operating	Construction	
Department of Land and Natural Resources, Forestry Division: Farm under development	Waialua and Mana	2,000	10	-	Planting period: 1977 to 1987 EIS: Not required. Federal permits: None required. State permits: Approval of Agricultural Districting by the LUC or Conservation Use Permit by the DLNR.

TABLE C-6d.--ENERGY TREE AND HAY FARMS ON MAUI AND MOLOKAI

County: Maui County

Agency	Nearest Town	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Department of Land and Natural Resources, Forestry Division: Farm under development	Lahaina, Makawao, and Kalae	790 acres	13	-	Planting period: 1977 to 1987 EIS: Not required. Federal permits: None required. State permits: Approval of Agricultural Districting by the LUC or Conservation Use Permit by the DLNR.
Molokai Ranch: Proposed growing of hay for energy		18,000 tons of hay per day			Proposed for use by Molokai Electric Co.

TABLE C-7a.--WIND ENERGY CONVERSION SYSTEMS ON OAHU¹

County: City and County of Honolulu

Company or Agency and Project	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construc- tion	
Marine Corps: Existing WECS ...	Kaneohe Marine Base	20 KW		-	Installed WECS to perfect operation and reliability.
Kahuku Fish Farm: Existing WECS	Kahuku	2 KW		-	Installed WECS for studying problems associated with synchronizing a WECS to an electrical grid.
Hawaiian Electric Co.: Committed for construction: Kahuku Turbine MOD OA	Kahuku	200 KW	-	12	Facility type: Wind turbine generator to be connected to the electrical grid. Construction period: 10/1979 to 12/1979 EIS: Not required. Federal permits: None required. State permits: None required.
Proposed: Large WECS	Kahuku	2.5 MW			Proposed for 1982 installation, subject to Federal funding.
Wind farm	Kahuku or Molokai	80 MW			The proposal involves Windfarms, Ltd., a division of Boeing Aircraft Co., who would sell electrical power to HECO. The wind farm would consist of 32 WECS of 2.5 MW each.

¹Excludes the very small WECS generally used on farms for pumping water.

TABLE C-7b.--WIND ENERGY CONVERSION SYSTEMS ON HAWAII¹

County: Hawaii County

Company or Agency	Location	Capacity (KW)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Kahua Ranch: WECS committed for construction	Kamuela	40			WECS for generating electrical power for ranch use, and tied into the electrical grid. Construction period: 10/1979 to 12/1979
Hawaii Housing Authority: Planned WECS	Honokaa	6 to 8			WECS for senior citizens' homes scheduled for 1980 installation.

¹Excludes the very small WECS generally used on farms for pumping water.

TABLE C-7c.--WIND ENERGY CONVERSION SYSTEMS ON MOLOKAI¹

County: Maui County

Company	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Davis Farm: WECS committed for construction	Hoolehua, Molokai	10 KW			WECS for generating electrical power for farm use, and tied into the electrical grid. Construction period: 10/1979 to 11/1979
Molokai Electric Co.: Proposed wind farm		0.7 MW			Proposed wind farm of 6 WECS of 112 KW each.
Hawaiian Electric Co.: Proposed wind farm					See Table for Oahu.

Excludes the very small WECS generally used on farms for pumping water.

TABLE C-8a.--GEOTHERMAL FACILITIES AND ACTIVITIES ON HAWAII

County: Hawaii County

Project	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Under construction: Hawaii Geothermal Research Station	3 MW	10	40	Facility type: Turbo-generator driven by geothermal stream. Location: Puna District Construction period: 7/1979 to 1980 EIS: Final draft completed. Federal permits: None required. State permits: Approval of Conservation Use Permit by the DLNR.
Proposed: Geothermal Industrial Park	800 acres			Facility type: Proposed industrial park dependent on direct heat from the Kapoho Geothermal Field. Location: Pahoa Status: Under study for engineering and economic feasibility.
Geothermal well drilling	-		45 per rig	Drilling is expected to start in 1980 or 1981.

TABLE C-8b.--GEOTHERMAL ACTIVITIES ON OAHU

County: City and County of Honolulu

Project	Peak Employment		Status and Comments
	Operating	Construction	
Proposed: Geothermal well drilling		45 per rig	Drilling is expected to start in Lualualei in the early 1980s.

TABLE C-8c.--GEOTHERMAL ACTIVITIES ON MAUI

County: Maui County

Project	Peak Employment		Status and Comments
	Operating	Construction	
Proposed: Geothermal well drilling		45 per rig	Drilling is expected to start in the early 1980s.

TABLE C-9.--ENERGY RESEARCH FACILITIES AT THE NATURAL ENERGY
LABORATORY OF HAWAII, KE-AHOLE POINT, HAWAII

County: Hawaii County

Facilities	Peak Employment		Status and Comments
	Operating	Construction	
Under construction: Seacoast Test Facilities	90	180	Activity: On-shore OTEC research laboratory. Construction period: 1979 to 1981 EIS: Final draft completed for shore facilities. Draft prepared for offshore facilities. Federal permits: None required. State permits: Approval of Conservation Use Permit by the Board of Land and Natural Resources.

TABLE C-10a.--OCEAN THERMAL ENERGY CONVERSION FACILITIES OFF HAWAII

County: Hawaii County

Facility	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Existing:				
Mini-OTEC	50 KW			Activity: Research of OTEC. Location: Anchored off Ke-ahole Point Status: Operational
Under construction:				
OTEC-1	1 MW heat exchanger	12	32	Activity: Research of OTEC. Location: Anchored off Ke-ahole Point Construction period: 1979 to 1980 EIS: Final draft completed. Federal permits: None required. State permits: Approval by DLNR.

TABLE C-10b.--OCEAN THERMAL ENERGY CONVERSION FACILITIES OFF OAHU

County: City and County of Honolulu

Facility	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Proposed: OTEC 10-40	10 to 40 MW			Proposed Federally-funded OTEC plant to be anchored off Kahe Point by the mid-1980s, and tied into the electrical grid. The proposal is by a team that includes: --Hawaiian Electric Co.; --Westinghouse Electric Corp.; --Dillingham Corp.; --Gibbs & Hill, Inc.; and --Brown and Root.

TABLE C-11a.--ETHANOL PRODUCTION FACILITIES ON OAHU

County: City and County of Honolulu

Company	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Del Monte Corporation: Existing facility	Honolulu	250 gallons per hour of 190 proof alcohol		-	Under study is a modification to increase capacity to 300 gallons per hour of 200 proof alcohol, and reduce idle time in order to make alcohol for producing gasahol. Presently, the alcohol is distilled from pineapple juice and molasses, and is used mostly for making vinegar.

TABLE C-11b.--ETHANOL PRODUCTION FACILITIES ON MAUI

County: Maui County

Company	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Alexander and Baldwin, Inc. and Maui Distillers, Inc.: Reopening of existing facility	Puunene	50,000 gallons per month of 190 proof alcohol	2 ¹		The reopening is planned for mid-1980, and an eventual doubling of capacity is planned. The ethanol will be produced from molasses, and about 10 to 20% of the product will be used to produce gasahol.

¹Peak operating employment is 12 jobs, with 2 jobs allocated to production of ethanol for use in producing gasahol.

TABLE C-12.--MUNICIPAL SOLID-WASTE-FUELED ENERGY FACILITIES ON OAHU

County: City and County of Honolulu

Project	Capacity	Peak Employment		Status and Comments
		Operating	Construction	
Committed for construction: HPOWER	1,800 tons of waste per day	130	350	<p>Facility type: Facility to burn and process municipal and other wastes to produce steam, electrical power, possibly fuel gas, and possibly to recover resources.</p> <p>Location: Waipahu or Campbell Industrial Park</p> <p>Construction period: 1980 to 1983</p> <p>EIS: Draft prepared.</p> <p>Federal permits: None required.</p> <p>State permits: None required.</p>

TABLE C-13.--OIL RECOVERY FACILITIES ON Oahu

County: City and County of Honolulu

Company	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Energy Recovery Systems of Hawaii: Existing facility	Campbell Industrial Park	1 million gallons per year	3	-	Existing facility for recycling waste oil into light fuel oil.

TABLE C-14a.---PETROLEUM AND ALCOHOL STORAGE TANKS,
HONOLULU HARBOR¹

County: City and County of Honolulu

Company	Number of Tanks	Capacity (barrels)	Peak Employment		Status and Comments
			Operating	Construction	
Existing tanks:					
Armour Oil Hawaii, Ltd.	8	8,000		-	
Hawaiian Electric Co., Inc.	4	158,420		-	
Isle Gas, Division of Honolulu Gas Co., Ltd.	5	3,570		-	Storage for liquified petroleum gas.
Phillips Petroleum Co.	9	245,000		-	
Shell Oil Co.	22	699,000		-	
Standard Oil Co. of California, Western Operations, Inc.	76	1,168,000		-	
Texaco, Inc.	4	217,000		-	
Union Oil Co. of California	15	437,500		-	
Hawaiian Independent Refinery, Inc. ...	2	30,000		-	
Committed for Construction:					
Pacific Resources, Inc.	1		-	40	Storage for alcohol. Construction period: 1980 EIS: Not required. Federal permits: Application has been made to DOE for cost throughput. State permits: None required.

¹Unless otherwise noted, storage for petroleum fuels, and excludes asphalt and ammonia storage tanks.

TABLE C-14b.--PETROLEUM STORAGE TANKS, CAMPBELL
INDUSTRIAL PARK, KAHE, AND WAI'AU

County: City and County of Honolulu

Company or Project	Number of Tanks	Capacity (barrels)	Peak Employment		Status and Comments
			Operating	Construc- tion	
Existing tanks:					
Chevron Refinery	91	3,960,000			This includes 5 spherical and sausage tanks for liquified petroleum gas.
Hawaii Independent Refinery, Inc. (of Pacific Resources, Inc.)..		3,500,000			
Hawaiian Electric Co.:					
Kahe	7	529,190			This includes 2 diesel tanks of 45,190 barrels.
Waiau	5	266,221			
Committed for Expansion:					
Hawaii Independent Refinery, Inc. ...	63	3,330,000	See Comment	See Comment	Comment: Status given in Table C-1 as part of refinery expansion.
Hawaiian Electric Co.	3	942,000	3	100	Construction period: 1980 to 12/1980 EIS: Not required. Federal permits: None required. State permits: None required.
Planned:					
Strategic Petroleum	8 to 29	2,700,000 to 9,700,000		500	Storage for crude oil and jet fuel for use during supply interruptions. Development is subject to Federal funding.

TABLE C-14c.--PETROLEUM STORAGE TANKS, HAWAII COUNTY

County: Hawaii

<u>Harbor/Company</u>	<u>Number</u>	<u>Capacity (barrels)</u>
Hilo Harbor:		
Isle Gas, Division of Honolulu Gas. Co., Ltd.	16 ¹	11,014 ¹
Phillips Petroleum Co.	4	18,500
Shell Oil Co.	7	42,909
Standard Oil of California, Western Operations, Inc.	20	163,944
Texaco, Inc.	5	21,284
Union Oil Co. of California	8	61,300
Kawaihae Harbor:		
Standard Oil Co. of California, Western Operations, Inc.	7	46,279
Union Oil Co. of California	7	53,714

¹Storage for liquified petroleum gas.

TABLE C-14d.--PETROLEUM STORAGE TANKS, KAUAI COUNTY

County: Kauai

<u>Location/Company</u>	<u>Number</u>	<u>Capacity (barrels)</u>
Nawiliwili Harbor:		
Union Oil Co. of California	7	21,500
Shell Oil Co.	7	23,452
Isle Gas, Division of Honolulu Gas Co., Ltd.	4 ¹	4,285 ¹
Port Allen:		
Standard Oil Co. of California, Western Operations, Inc.	7	81,775
Ahukini:		
Standard Oil Co. of California, Western Operations, Inc.	5	16,778

¹Storage for liquified petroleum gas.

TABLE C-14e.---PETROLEUM STORAGE TANKS, MAUI COUNTY

County: Maui

<u>Harbor/Company</u>	<u>Number</u>	<u>Capacity (barrels)</u>
Kahului Harbor, Maui:		
Isle Gas, Division of Honolulu Gas Co., Ltd.	6 ¹	1,430 ¹
Shell Oil Co.	9	96,650
Standard Oil Co. of California, Western Operations, Inc.	6	159,674
Texaco, Inc.	6	10,413
Union Oil Co. of California	6	80,000
Kaunakakai Harbor, Molokai:		
Shell Oil Co.	?	?
Standard Oil Co. of California	?	13,943
Kaunapali Harbor, Lanai:		
Standard Oil Co. of California	?	21,029

¹Storage for liquified petroleum gas.

TABLE C-15.--OAHU ENERGY CORRIDOR

County: City and County of Honolulu

Agency/Project	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
State Department of Transportation: Oahu Energy Corridor: Existing	Campbell Indus- trial Park to Honolulu Harbor	5 pipelines		-	Corridor for transporting oil, gas, and electrical power.

TABLE C-16.--COAL HANDLING FACILITIES OF CEMENT COMPANIES ON OAHU

County: City and County of Honolulu

Company	Location	Capacity	Peak Employment		Status and Comments
			Operating	Construction	
Cyprus Hawaiian Cement Corp.: Coal handling facilities committed for construction ...	Campbell Industrial Park				Announced for construction during 1980.
Kaiser Cement & Gypsum: Coal handling facilities committed for construction ...	Campbell Industrial Park	60,000 to 80,000 tons of coal per year	26	75	Facilities for receiving the coal at Honolulu Harbor, transporting it to Campbell Industrial Park, storing it, and grinding it. Construction period: 11/1979 to 5/1980 EIS: Not required. Federal permits: None required. State permits: Application made to the DOH for Authority to Construct Permit (air quality).

TABLE C-17.--OFFSHORE MOORING AND PIPELINE FACILITIES FOR
TRANSFERRING OIL PRODUCTS, BARBERS POINT, OAHU

County: City and County of Honolulu

<u>Company</u>	<u>Existing Submarine Pipelines</u>
Chevron, Inc.	30" marine pipeline for unloading crude oil from tankers. 20" marine black oil pipeline for loading fuel oil into small tankers and barges.
Hawaiian Independent Refinery, Inc., of Pacific Resources, Inc.	30" marine pipeline for unloading crude oil from tankers. 20" marine pipeline for loading refined fuels onto small tankers and barges. 16" marine pipeline for lighter oils.

TABLE C-18.--BARBERS POINT HARBOR FACILITIES FOR HANDLING
PETROLEUM PRODUCTS

County: City and County of Honolulu

Facility or Activity	Capacity	Peak Employment		Status and Comments
		Operating	Construc- tion	
Existing barge harbor		-	-	Current Use: Berth used by Gas Co. for loading liquified petroleum gas, and by Texaco for loading petroleum products.
Planned dredging for large deep-draft harbor	330 acres (246 acres in Phase I), with an inshore basin of 46 acres and a depth of 38 feet		95 ¹	Four terminals are planned, one of which will be for handling petroleum products. The dredging will involve about 10.6 million cubic yards. Dredging period: 2/1980 to 1984 EIS: Final draft prepared. Federal permits: None required. State permits: Urban districting has been approved by the Land Use Commission.

¹The peak construction employment of 95 jobs reflects the allocation to the petroleum terminal, and is one-fourth of the estimated total.

TABLE C-19a.--PIERS WITH FACILITIES FOR HANDLING OIL AT
HONOLULU HARBOR

County: City and County of Honolulu

Piers ¹	Uses	Pipelines		
		Number	Size (inches)	Product Type
Piers 1 and 2 ²	Receipt of petroleum products plus other uses	1	14	Fuel oil
		1	10	Fuel oil
Piers 28, 29A, and 29 ²	Receipt and shipment of petroleum products plus other uses	1	10 to 8	Fuel oil
		1	10	Aviation gasoline
		2	10	Fuel oil
		2	8	Fuel oil
		1	6	Solvent
		1	6	Lubricating oil
Piers 30, 31A, 31, 32, and 33 ³	Receipt and shipment of petroleum products plus other uses	2	8	Fuel oil
		1	8	Diesel
		2	6	Gasoline
		1	6	Kerosene
		1	6	Diesel
Pier 34	Receipt of petroleum products plus other uses	1	14	Fuel oil
		4	10	-
		1	8	Diesel oil
		4	6	-
Pier 38 ⁴	Shipment by barge	2	4	Liquified petroleum gas
Pier 51A ⁵	Receipt of petroleum products plus other uses	2	12	-

¹Unless otherwise noted, the piers are owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.²Operated by Matson Terminals, Inc.³Pier 30 owned and operated by Standard Oil Co. of California.⁴Operated by Isle Gas, Division of Honolulu Gas Co., Ltd.⁵Operated by Texaco, Inc., Shell Oil Co., and U.S. Lines.

TABLE C-19b.--PIERS WITH FACILITIES FOR HANDLING
OIL ON HAWAII

County: Hawaii

Harbor and Piers ¹	Uses	Pipelines		
		Number	Size (inches)	Product Type
Hilo Harbor:				
Pier 1	Receipt of petroleum products plus other uses	1	10	-
Pier 3	Receipt of petroleum products and liquified petroleum gas, plus other uses	1	10	-
		5	8	-
		1	8	Liquified petroleum gas
		5	6	-
		1	4	-
Kawaihae Harbor:				
Overseas Terminal Wharf ²	Receipt of petroleum products plus other uses	4	8	-
		3	6	-

¹Unless otherwise noted, the piers are owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.²Operated by Kawaihae Terminals, Inc.

TABLE C-19c.--PIERS WITH FACILITIES FOR HANDLING
OIL ON KAUAI

County: Kauai

Harbor and Piers ¹	Uses	Pipelines		
		Number	Size (inches)	Product Type
Nawiliwili Harbor:				
Piers 1 and 2	Receipt of petroleum products and liquified petroleum gas, plus other uses	1	8	Liquified petroleum gas
		2	6	-
		4	4	-
Port Allen Harbor:				
Port Allen Pier	Receipt of petroleum products	2	10	-
		3	8	-

¹Piers are owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.

TABLE C-19d.--PIERS WITH FACILITIES FOR HANDLING
OIL ON MAUI, MOLOKAI, AND LANAI

County: Maui

Harbor and Piers ¹	Uses	Pipelines		
		Number	Size (inches)	Product Type
Kahului Harbor, Maui:				
Pier 1	Receipt of petroleum products plus other uses	1	10	-
		4	6	-
Pier 2	Receipt of petroleum products and liqui- fied petroleum gas, plus other uses	1	8	Liquified petroleum gas
		2	6	-
		1	6	Fuel oil for fishing vessels
Kaunakakai Harbor, Molokai	Receipt of petroleum products by barge, plus other uses			
Kaumalapau Harbor, Lanai ²	Receipt of petroleum products by barge, plus other uses			

¹Unless otherwise noted, piers are owned and operated by the State of Hawaii, Department of Transportation, Harbors Division.²Owned and operated by Dole Pineapple Co.

APPENDIX D

GENERAL IMPACT ASSESSMENTS FOR ENERGY FACILITIES

<u>Table</u>	<u>Page</u>
1.--OIL REFINERIES	D-1
2.--ELECTRIC COMPANY OIL-FUELED GENERATING PLANTS	D-5
3.--SUGAR COMPANY BIOMASS AND OIL-FUELED GENERATING PLANTS	D-10
4.--HYDROELECTRIC PLANTS	D-14
5.--SOLAR HOT-WATER HEATERS	D-16
6.--PHOTOVOLTAIC SYSTEMS	D-18
7.--ENERGY TREE FARMS	D-20
8.--WIND ENERGY CONVERSION SYSTEMS (WECS)	D-24
9.--GEOTHERMAL POWER PLANTS	D-27
10.--ENERGY RESEARCH FACILITIES AT THE NATURAL ENERGY LABORATORY OF HAWAII AT KE-AHOLE POINT, HAWAII	D-31
11.--OCEAN THERMAL ENERGY CONVERSION (OTEC) PLANTS	D-36
12.--ETHANOL PRODUCTION FACILITIES	D-40
13.--MUNICIPAL SOLID-WASTE-FUELED ENERGY FACILITIES	D-42
14.--OIL RECOVERY FACILITIES	D-46
15.--FUEL STORAGE TANKS	D-48
16.--OAHU ENERGY CORRIDOR	D-52
17.--COAL HANDLING FACILITIES OF CEMENT COMPANIES	D-54
18.--OFFSHORE MOORING FACILITIES FOR TRANSFERRING OIL PRODUCTS	D-56
19.--HARBOR FACILITIES FOR OIL HANDLING	D-58

TABLE D-1a.--CHARACTERISTICS OF OIL REFINERIES

Type of Energy Facility: Refinery for processing crude oil into fuels

Associated Developments:

- Permanently anchored mooring buoys for large tankers and barges
- A field of large storage tanks
- Large submarine pipelines for unloading crude oil from large tankers and loading refined fuels into barges and small tankers
- Surface pipelines to transfer fuels among the refinery, storage tanks, the tie-in to the submarine pipeline, and Honolulu Harbor
- Waste treatment facility and injection well or ocean diffuser for disposal of treated effluents
- Flare for burning exhaust gases
- Truck loading facilities
- Administrative, maintenance and service facilities

General Description and Characteristics:

Forms of Energy Produced: Gasoline, jet fuel, diesel fuel, heavy fuel oil, propane, butane, ships bunker, LPG and SNG

Energy Source: Crude Oil

Capacity Range: 44,000 to 125,000 barrels per day

By- and Waste Products: None

Area Requirements: 200 to 300 acres

Site and Location Requirements: An industrial area suitable for noxious industries (downwind and remote from residential and commercial areas); deep offshore waters suitable for large, deep-draft tankers, ocean currents and winds that would carry oil spills out to sea; availability of utilities; land that is inexpensive, relatively flat, capable of supporting heavy loads; and safe from hazards (earthquakes, tsunamis, lava flows, storm winds and waves, blasts, etc.)

Status of Technology and Extent of Development: Two refineries are located at Campbell Industrial Park (CIP) and two more were proposed in the early 1970s--one at CIP and one on Hawaii Island.

Other Distinguishing Features:

TABLE D-1b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR OIL REFINERIES

Impacts

1. Noise and dust during construction; turbidity and sedimentation during dredging for submarine pipelines; and fish kill during blasting for buoy anchors.

Mitigating Measures:

Minimize noise and dust by using special equipment and watering construction area.

Financing of Mitigating Measures:

Increased cost of construction paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced dust levels and reduced noise to meet OSHA standards.

2. Lost vegetation and habitat for animals and birds; lost coral habitat along the submarine pipeline.

Mitigating Measures:

Location of refinery facilities and pipelines so as to avoid or minimize adverse impacts on environmentally sensitive areas.

Financing of Mitigating Measures:

Increased cost paid by the developer of the refinery.

Anticipated Effectiveness of Mitigating Measures:

Reduced loss of vegetation, animal and bird habitats. Shoreline ecosystems, coral and fish habitats enhanced by providing sheltered areas.

3. Adverse visual appearance of the refinery and storage tanks.

Mitigating Measures:

Landscaping around site boundaries and painting tanks pastel colors.

Financing of Mitigating Measures:

Increased cost paid by the developer of the refinery.

Anticipated Effectiveness of Mitigating Measures:

Slight improvement in appearance.

TABLE D-1b. (continued)

Impacts

4. Exclusion of fishing and recreational boating from the anchorage areas.

Mitigating Measures:

Limit boating only when a tanker is moored.

Financing of Mitigating Measures:

None

Anticipated Effectiveness of Mitigating Measures:

Minimum exclusion of boating activities.

5. Sulfur dioxide air pollution.

Mitigating Measures:

Location of the refinery where emissions will be blown out to sea, use of low-sulfur fuels and sulfur-free fuel gas, and scrubbing sulfur from low-grade process gas.

Financing of Mitigating Measures:

Increased cost paid by the developer of the refinery.

Anticipated Effectiveness of Mitigating Measures:

Minimal air pollution.

6. Possible oil spill from tankers and loss of marine and bird life, particularly along the shoreline if the oil should be blown on-shore.

Mitigating Measures:

No loading or unloading of oil and fuels during on-shore winds, combined with normal operations to detect spills, contain and clean them up, and restore the environment insofar as is practical.

Financing of Mitigating Measures:

Increased cost to be paid by the operator of the facility.

Anticipated Effectiveness of Mitigating Measures:

Little reduction in risk to sea birds. Reduced risk to marine biota in the intertidal zone and nearshore waters.

TABLE D-1b. (continued)

Impacts

7. Possible on-site oil spills and seepage into the ground water.

Mitigating Measures:

Areas subject to spills should be paved and drained to the wastewater treatment facilities.

Financing of Mitigating Measures:

Increased cost to be paid by the developer of the facility.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of contamination of ground waters.

8. Possible but unlikely rupture of a crude-oil storage tank.

Mitigating Measures:

Dikes surrounding the storage tanks to contain major oil spills and sump pumps to recover the oil.

Financing of Mitigating Measures:

Increased cost to be paid by the developer of the refinery.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of damage from ruptured oil-storage tanks.

9. Small risk of fire.

Mitigating Measures:

Physical separation from other activities and facilities, and standard safety precautions.

Financing of Mitigating Measures:

Increased cost to be paid by the developer of the facility.

Anticipated Effectiveness of Mitigating Measures:

Reduction in danger of fire or explosion, and reduction in exposure for other activities and facilities.

TABLE D-1b. (continued)

Impacts

10. Small increase in infrastructure and service needs (roads, water, police, fire, schools, parks, etc.) to accommodate the refinery and the families of new employees (both direct and indirect) attracted to the area.

Mitigating Measures:

The State and County should provide infrastructure and services as needed.

Financing of Mitigating Measures:

Infrastructure and service needs to be paid by State and County governments, with possible assistance from the Federal government for qualifying projects.

Anticipated Effectiveness of Mitigating Measures:

Adequate provision of government facilities and services.

TABLE D-2a.--CHARACTERISTICS OF ELECTRIC COMPANY
OIL-FUELED GENERATING PLANTS

Type of Energy Facility: *Oil-fueled electric generating power plants (steam turbines, gas turbines, and internal combustion diesel generators)*

Associated Developments:

- High-voltage power lines
- Access road
- For steam turbines, large diameter pipelines extending into the ocean for collecting and discharging cooling waters
- Fuel storage tanks

General Description and Characteristics:

Form of Energy Produced: *Electrical power*

Energy Source: *Fuel oil, including diesel fuel, and possibly supplemental biomass fuels*

Capacity Range: *Over 500 megawatts for the largest generating plant in Hawaii*

By- and Waste Products: *Fuel exhaust and, for steam turbines, heated cooling water*

Area Requirements:

Site and Location Requirements: *Preferably on a leeward, rocky shore removed from populated areas. Thus, ocean water is available for cooling, there is no loss of a beach, and air pollution is blown offshore by tradewinds.*

Status of Technology and Extent of Development: *Developed technology used on all islands*

Other Distinguishing Features:

TABLE D-2b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR ELECTRIC COMPANY OIL-FUELED GENERATORS

Impacts

1. Noise and dust during construction.

Mitigating Measures:

Minimize noise and dust by using special equipment and watering construction area.

Financing of Mitigating Measures:

Provided by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced air pollution.

2. Adverse visual appearance of the power plant and associated developments.

Mitigating Measures:

Placement of the power plant in an area of minimal visibility and landscaping to improve the appearance.

Financing of Mitigating Measures:

Increased cost paid by the electric company and passed on to the ratepayers.

Anticipated Effectiveness of Mitigating Measures:

Reduced visibility of the power plant.

3. Air pollution from burning fuels.

Mitigating Measures:

Use of "clean" fuels, devices to clean the exhaust, and high stacks.

Financing of Mitigating Measures:

Increased cost paid by the electric company and passed on to the ratepayers.

Anticipated Effectiveness of Mitigating Measures:

Reduced air pollution.

TABLE D-2b. (continued)

Impacts

4. Possible fuel spills during sea transport, off-loading, and land transport.

Mitigating Measures:

No unloading of fuels during high-risk situations, combined with normal operations to detect spills, contain and clean them up, and restore the environment insofar as is practical.

Financing of Mitigating Measures:

Increased cost paid by the electric company and passed on to the ratepayers.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of damage from oil spills.

5. For power plants having steam turbine generators which require ocean waters for cooling:

- (a) Damage to coral caused by dredging for the pipelines.

Mitigating Measures:

None

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

- (b) Thermal pollution of the adjacent waters, and resulting coral kill and loss of fish habitat.

Mitigating Measures:

Longer pipelines that discharge the hot water in deeper water.

Financing of Mitigating Measures:

Increased cost paid by the electric company and passed on to the ratepayers.

Anticipated Effectiveness of Mitigating Measures:

Reduced thermal pollution, but increased damage to coral (see "a").

TABLE D-2b. (continued)

Impacts

5. (c) Loss of recreational use of the affected shoreline, and blocked access to and along the shoreline.

Mitigating Measures:

Location of the power plant and pipeline along the shorelines of low recreational use, or compensating purchase of other recreational areas.

Financing of Mitigating Measures:

Increased cost paid by the electric company, and possible purchase of recreational areas using a CEIP environmental grant.

Anticipated Effectiveness of Mitigating Measures:

Partial to complete replacement of recreational loss.

6. Small risk of fire or explosion associated with fuel storage tanks.

Mitigating Measures:

Physical separation from other activities and facilities, and standard safety precautions.

Financing of Mitigating Measures:

Increased costs paid by the electric company.

Anticipated Effectiveness of Mitigating Measures:

Reduction in danger of fire or explosion, and reduction in exposure for other activities and facilities.

TABLE D-3a.--CHARACTERISTICS OF SUGAR COMPANY BIOMASS AND
OIL-FUELED GENERATING PLANTS

Type of Energy Facility: *Sugar mill generators (mostly steam generators, but a few diesel generators)*

Associated Developments:

- Sugarcane fields*
- Sugar mill*
- Electrical power lines to tie into the electrical power grid*
- Sugarcane hauling roads*

General Description and Characteristics:

Forms of Energy Produced: *Electrical power and steam*

Energy Source: *For steam generators, bagasse and possibly bagasse pellets, sugarcane trash, wood chips, municipal trash, macadamia nut shells, and fuel oil. For diesel generators, diesel fuel.*

Capacity Range: *1 to 25 megawatts*

By- and Waste Products: *Sugarcane trash and soils washed from the cane at the mill*

Area Requirements: *Minimal for the generator*

Site and Location Requirements: *Within a sugar mill*

Status of Technology and Extent of Development: *A proven technology used by sugar companies throughout the State. Biomass fuel provides about 14% of the electrical power generated in the State.*

Other Distinguishing Features:

TABLE D-3b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES FOR SUGAR COMPANY
BIOMASS AND OIL-FUELED GENERATING PLANTS

Impacts

1. Dust Associated with acreage expansion.

Mitigating Measures:

Watering of newly-cleared land.

Financing of Mitigating Measures:

Increased cost paid by the sugar operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced dust.

2. Water pollution caused by field runoff of soils, fertilizers, pesticides, and herbicides.

Mitigating Measures:

"Best Management Practices" to control runoff as approved by
by Soil and Water Conservation District.

Financing of Mitigating Measures:

Increased cost paid by the sugar operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced water pollution.

3. Air pollution from sugarcane field burning.

Mitigating Measures:

No field burning whenever carbon monoxide and haze levels are
high. For Oahu, this means no burning during Kona winds.
For the neighbor islands, this means no burning during the
simultaneous events of a Big Island volcanic eruption and
Kona winds.

Financing of Mitigating Measures:

None

Anticipated Effectiveness of Mitigating Measures:

Reduced air pollution problems.

TABLE D-3b. (continued)

Impacts

4. Minimal air pollution from the sugar mill stack emissions.

Mitigating Measures:

Devices to reduce emissions.

Financing of Mitigating Measures:

Increased cost paid by the sugar operator.

Anticipated Effectiveness of Mitigating Measures:

Minimal stack emissions.

5. Water pollution from mill wastewater disposal.

Mitigating Measures:

Settling ponds and other means to clean waters.

Financing of Mitigating Measures:

Increased cost paid by the sugar operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced water pollution.

6. Negative visual impact of the sugar mill.

Mitigating Measures:

None

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

7. Noise from trucks and mills.

Mitigating Measures:

Use of special equipment and devices to reduce noise.

Financing of Mitigating Measures:

Increased cost paid by the sugar operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced noise.

Impact

TABLE D-3b. (continued)

Impacts

8. Road deterioration from hauling cane and increased cane trash for fuel on roads not built to handle the large sugarcane trucks.

Mitigating Measures:

Frequent road maintenance and resurfacing.

Financing of Mitigating Measures:

Increased cost paid by the State or County for public roads,
and by the sugar operator for private roads.

Anticipated Effectiveness of Mitigating Measures:

Reduced road hazards.

TABLE D-4a.--CHARACTERISTICS OF HYDROELECTRIC PLANTS

Type of Energy Facility: *Small run-of-the-river hydroelectric plants*

Associated Developments:

- Dam or stream diversion system with limited pondage
- Electric power lines
- Access road

General Description and Characteristics:

Form of Energy Produced: *Electrical power*

Energy Source: *Flowing or falling water*

Capacity Range: *Up to 2 M.W. for hydroelectric plants in Hawaii*

By- and Waste Products: *None*

Area Requirements: *N.A.*

Site and Location Requirements: *Along a large stream*

Status of Technology and Extent of Development: *Proven technology*

Other Distinguishing Features: *Most hydroelectric plants in Hawaii are owned by sugar companies.*

TABLE D-4b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR HYDROELECTRIC PLANTS

Impacts

1. Harm or destruction to the environment at dam site.

Mitigating Measures:

Careful selection of the dam site so as to avoid environmentally sensitive areas.

Financing of Mitigating Measures:

Increased costs paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced impact to environmentally sensitive areas.

2. Adverse impacts on downstream environments, including sensitive and valuable habitats, if stream flows should be interrupted.

Mitigating Measures:

Maintenance of minimum stream flows.

Financing of Mitigating Measures:

Increased costs paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal impact on downstream environments.

TABLE D-5a.--CHARACTERISTICS OF SOLAR HOT WATER HEATERS

Type of Energy Facility: *Small solar hot water heaters for homes and apartments*

Associated Developments:

General Description and Characteristics:

Form of Energy Produced: *Hot water*

Energy Source: *Solar heat*

Capacity Range:

By- and Waste Products: *None*

Area Requirements: *Negligible*

Site and Location Requirements: *Roof of home or apartment*

Status of Technology and Extent of Development: *In 1979, an estimated 12,000 homes had solar hot water heaters here in Hawaii, and new systems were being installed at a rate in excess of 3,000 per year.*

Other Distinguishing Features:

TABLE D-5b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR SOLAR HOT WATER HEATERS

Impacts

1. Minor visual impact.

Mitigating Measures:

None

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

TABLE D-6a.--CHARACTERISTICS OF PHOTOVOLTAIC SYSTEMS

Type of Energy Facility: *Photovoltaic system*

Associated Developments:

General Description and Characteristics:

Forms of Energy Produced: *Electrical power and hot water*

Energy Source: *Solar*

Capacity Range:

By- and Waste Products:

Area Requirements:

Site and Location Requirements:

Status of Technology and Extent of Development: *Developing technology*

Other Distinguishing Features:

TABLE D-6b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR PHOTOVOLTAIC SYSTEMS

Impacts

1. Slight visual impact.

Mitigating Measures:

None

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

TABLE D-7a.--CHARACTERISTICS OF ENERGY TREE FARMS

Type of Energy Facility: Cultivation of trees to be used for fueling a
(sugar mill) boiler

Associated Developments:

--Service roads for use in cultivating and harvesting trees

General Description and Characteristics:

Form of Energy Produced: Wood chips for fueling a boiler

Energy Source: Solar, along with soil, fertilizer water, labor, etc.

Capacity Range: Equivalent of 20 to 25 barrels of oil per acre per year

By- and Waste Products: None

Area Requirements: 1000 to 3000 acres near a sugar mill boiler having a generation capacity of 1.5 to 5 megawatts

Site and Location Requirements: On land that:

- is marginal agricultural or disturbed forest land with suitable soil,
- has adequate rainfall or supplementary irrigation, and
- is reasonably close (within 25 miles) to the boiler to be fueled.

Status of Technology and Extent of Development: Developed technology

Other Distinguishing Features:

TABLE D-7b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR ENERGY TREE FARMS

Impacts

1. Disruption of wildlife and wildlife habitats during site preparation and harvesting.

Mitigating Measures:

Location of the tree farm so as to avoid environmentally sensitive areas.

Financing of Mitigating Measures:

Increased cost paid by forest operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced loss of wildlife and wildlife habitats.

2. Dust during site preparation and harvesting.

Mitigating Measures:

Water sprinkling of unpaved roads and other areas highly prone to having dust problems.

Financing of Mitigating Measures:

Increased cost paid by forest operator.

Anticipated Effectiveness of Mitigating Measures:

Decreased problems from dust.

3. Erosion of the planted areas, particularly during site preparation and harvesting, and continual erosion of the roads.

Mitigating Measures:

Application of "Best Management Practices" (BMPs) for farm operations as approved by the appropriate Soil and Water Conservation District.

Financing of Mitigating Measures:

BMPs to control field runoff from private lands should be paid using private financing plus Federal assistance from the U.S. Department of Agriculture.

Anticipated Effectiveness of Mitigating Measures:

Reduced erosion and water-quality problems.

TABLE D-7b. (continued)

Impacts

4. Runoff of soils, fertilizers, herbicides, and pesticides which cause such problems as:

- sedimentation which smothers coral;
- turbidity which is an aesthetic and safety problem;
- excessive phytoplankton growth and disruption of the ecosystem balance because of the fertilizers; and
- toxic substances from the herbicides and pesticides which adversely affect the ecosystem.

Mitigating Measures:

Application of "Best Management Practices" (BMPs) for farm operations as approved by the appropriate Soil and Water Conservation District.

Financing of Mitigating Measures:

BMPs to control field runoff from private lands should be paid using private financing plus Federal assistance from the U.S. Department of Agriculture.

Anticipated Effectiveness of Mitigating Measures:

Reduced runoff.

5. Possible introduction of exotic species or diseases during production or harvesting.

Mitigating Measures:

Cleaning of equipment prior to entering forest areas. Exercise of pest control or removal.

Financing of Mitigating Measures:

Increased cost paid by forest operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced problems from exotic species and diseases.

6. Noise from chipping wood and from hauling trucks.

Mitigating Measures:

Location of operations away from populated areas, and use of equipment to reduce noise.

Financing of Mitigating Measures:

Increased cost paid by forest operator.

TABLE D-7b. (continued)

Impacts

6. (continued)

Anticipated Effectiveness of Mitigating Measures:

Reduced noise problems.

7. Visual disturbance to areas being planted and harvested, and by the service roads.

Mitigating Measures:

Locate the energy farm away from areas of high visibility insofar as practical.

Financing of Mitigating Measures:

Increased cost paid by forest operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced visual disturbance.

TABLE D-8a.--CHARACTERISTICS OF WIND ENERGY CONVERSION SYSTEMS

Type of Energy Facility: Wind Energy Conversion Systems (WECS)

Associated Developments:

- Power lines and transformers to connect the WECS to the electric power grid
- Fences surrounding the site
- Access road

General Description and Characteristics:

Forms of Energy Produced: Electrical power or possible mechanical energy to pump water

Energy Source: Wind

Capacity Range: Up to 2.5 M.W. per WECS

By- and Waste Products: None

Area Requirements: Wind farms of up to 2,060 acres involving 32 WECS have been proposed for Hawaii.

Site and Location Requirements: Large WECS and wind farms should be located in areas having strong, steady winds (mountain gaps and the corners of islands) and where visual intrusion, interference with television and radio reception, and interference with aircraft and migrating birds are minimized.

Status of Technology and Extent of Development: WECS that are tied into an electric power grid are now being tested.

Other Distinguishing Features: A large 2.5 M.W. WECS under development by Boeing Engineering and Construction (MOD-2 Wind Turbine System) has a rotor diameter of 300 feet and a tower of about 200 feet.

TABLE D-8b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR WIND ENERGY CONVERSION SYSTEMS

Impacts

1. Visual intrusion which may be viewed as adverse to some.

Mitigating Measures:

Placement of WECS and fences to minimize visual intrusion.

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimum visibility.

2. Interference with television and radio reception near the windmills.

Mitigating Measures:

Placement of WECS to minimize reception problems, and use of cable TV.

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimum interference with TV and radio reception.

3. Possible noise problems for a large collection of WECS.

Mitigating Measures:

Placement of WECS to minimize noise problems.

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced or minimal noise problems.

4. Minor ecosystem damage caused by site preparation and installation.

Mitigating Measures:

Avoidance of environmentally sensitive areas.

TABLE D-8b. (continued)

Impacts

4. (continued)

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal loss of environmentally sensitive areas.

5. Potential safety hazard if towers should collapse or blades separate during a severe storm.

Mitigating Measures:

Design standards requiring the WECS to withstand severe storms, and a safety area surrounding each system.

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal safety hazards.

6. Possible interference with aircraft.

Mitigating Measures:

Placement of WECS away from airports and airplane routes.

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal interference with aircraft.

7. Possible interference with migrating birds.

Mitigating Measures:

Placement of WECS away from the path of migrating birds.

Financing of Mitigating Measures:

Increased costs paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal interference with migrating birds.

TABLE D-9a.--CHARACTERISTICS OF GEOTHERMAL POWER PLANTS

Type of Energy Facility: *Geothermal wells with steam-driven turbo-generators, and facilities for direct use of the steam and hot water*

Associated Developments:

- Access roads
- Electric power lines
- Injection wells or surface ponds to dispose of waste waters.

General Description and Characteristics:

Forms of Energy Produced: *Steam and electric power*

Energy Source: *Steam from a geothermal well*

Capacity Range:

By- and Waste Products:

- Large quantities of hot mineral-rich water formed when the geothermal steam condenses
- Sulfur sludge if scrubbers used to control smells

Area Requirements:

Site and Location Requirements:

- Above geothermal reservoirs, which are believed to exist on the Islands of Hawaii, Maui, Molokai, Oahu, and Kauai
- Removed from population centers in order to avoid problems of noise, sulfur smells, and visual intrusions

Status of Technology and Extent of Development: *A new research geothermal well is located near Pahoa on the Island of Hawaii. Additional areas having geothermal potential have been identified throughout the State, and extensive geothermal development is expected over the next decade.*

Other Distinguishing Features:

TABLE D-9b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR GEOTHERMAL POWER PLANTS

Impacts

1. Drilling noise.

Mitigating Measures:

Use of control technology to reduce noise.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced noise.

2. Risk of blowout during drilling, causing risk of bodily injury, noise, air pollution, and pollution of surface and groundwaters.

Mitigating Measures:

Minimize risk through use of improved drilling techniques and blowout preventers.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of blowouts.

3. Contamination of groundwater if present and if the well casing should leak.

Mitigating Measures:

Proper cementing of well casing to about 1000 feet below the fresh water lens.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of groundwater contamination.

TABLE D-9b. (continued)

Impacts

4. Visual intrusion.

Mitigating Measures:

Facilities set back from road and surrounding with landscaping.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced visual intrusion.

5. Sulfur smells.

Mitigating Measures:

Injection wells or scrubbers to control smells.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced sulfur smells.

6. Noise, including venting of steam during plant shutdown.

Mitigating Measures:

Installation of silencers and possibly muffling the sound by discharging the steam through a vent submerged in water.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced noises.

TABLE D-9b. (continued)

Impacts

7. Surface disposal of wastewater will percolate down and may possibly pollute the groundwater supply.

Mitigating Measures:

Allow settling basins if the geothermal wells are over groundwater, but study impacts. If there is a risk of polluting the groundwater supply, then inject the wastewater into the geothermal reservoir.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of groundwater contamination.

8. Possible but unlikely land surface subsidence and induced seismicity.

Mitigating Measures:

Monitor for subsidence and increased seismicity.

Financing of Mitigating Measures:

Government financing.

Anticipated Effectiveness of Mitigating Measures:

Detection of subsidence and increased seismicity.

9. Possible significant secondary impacts if a field of geothermal wells should generate an excess supply of power that attracts a large amount of economic growth. This could require such infrastructure facilities and services as roads, water, sewage waste disposal, schools, libraries, parks, police, fire, and health.

Mitigating Measures:

To be determined as part of specific proposals.

Financing of Mitigating Measures:

To be determined.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

TABLE D-10a.--CHARACTERISTICS OF ENERGY RESEARCH FACILITIES AT THE
NATURAL ENERGY LABORATORY OF HAWAII, KE-AHOLE POINT,
HAWAII

Type of Energy Facility: *Shore-based facilities for research into OTEC,
direct solar, biomass, etc.*

Associated Developments:

- For OTEC, large diameter pipelines for transporting cold deep seawater and warm surface water to shore, and transporting water back out to sea
- Two-mile, two-lane access road, with possible expansion to four lanes
- Utility corridor for water, sewage, electricity, and telecommunications
- Electrical building
- 300,000-gallon water storage tank
- Sewage pump station
- Possibly a neighboring 12-acre Phase I aquaculture development to use the nutrient-rich deep sea water used in the OTEC research

General Description and Characteristics:

Forms of Energy Produced: *Not applicable--the facilities will be used for research with little or no permanent generation of power.*

Energy Source:

- For OTEC, warm surface water and cold sea water from a depth of about 2,000 feet
- Direct solar
- Biomass

Capacity Range: N.A.

By- and Waste Products:

- Cold, nutrient-rich sea water from lower depths
- Possibly fresh water from an open-cycle OTEC system

Area Requirements: 240 acres

Site and Location Requirements: *Ke-ahole Point, Hawaii. This is a very sunny coastal area where the nearby ocean floor drops off rapidly to a depth of over 2,000 feet.*

Status of Technology and Extent of Development: *Undergoing development. Buildings, the road, and utilities have been completed. A pilot OTEC facility is now under design and should be operating in 1980.*

Other Distinguishing Features:

TABLE D-10b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR ENERGY RESEARCH FACILITIES AT THE
NATURAL ENERGY LABORATORY OF HAWAII,
KE-AHOLE POINT, HAWAII

Impacts

1. Loss of sparse natural vegetation and wildlife habitat.

Mitigating Measures:

Choosing of sites that avoid environmentally sensitive areas.

Financing of Mitigating Measures:

Increased cost paid by the government.

Anticipated Effectiveness of Mitigating Measures:

Minimal loss of environmentally sensitive areas.

2. Increased access to and recreational use of the area, resulting in increased litter and possible degradation of environmentally sensitive areas (e.g., beach zone, small brackish water ponds, and several minor and possibly two significant archaeological sites).

Mitigating Measures:

Choosing of sites and access routes that avoid environmentally sensitive areas, and litter control programs.

Financing of Mitigating Measures:

Increased cost paid by the government.

Anticipated Effectiveness of Mitigating Measures:

Reduced problems of litter and environmental degradation.

3. Increased noise and dust during construction.

Mitigating Measures:

Watering of areas to control dust.

Financing of Mitigating Measures:

Increased cost paid by the government.

Anticipated Effectiveness of Mitigating Measures:

Reduced problems from dust.

TABLE D-10b. (continued)

Impacts

4. Adverse visual impact compared to the natural untouched land.

Mitigating Measures:

Limited scale of buildings, high design standards, landscaping, and underground utilities.

Financing of Mitigating Measures:

Increased cost paid by the government.

Anticipated Effectiveness of Mitigating Measures:

Reduced visual impact.

5. For OTEC, the large diameter intake and discharge pipelines and the trenching for them through the surf zone will have an adverse effect on the physical environment of the shoreline and offshore reef areas, particularly during construction.

Mitigating Measures:

The pipeline routine should avoid environmentally sensitive areas to the extent possible.

Financing of Mitigating Measures:

Increased cost paid by the government.

Anticipated Effectiveness of Mitigating Measures:

Reduced damage to the environment.

6. For OTEC, the discharge of large volumes of cold nutrient-rich water into shallow water will have a localized impact on temperatures and benthic organisms, particularly corals. For an open-cycle system, the discharged seawater will also have increased salinity due to fresh water removal.

Mitigating Measures:

Offshore discharge into water 180 feet deep, and onshore discharge into an injection well. This removes impact from the immediate nearshore area.

Financing of Mitigating Measures:

Increased cost paid by the government.

Anticipated Effectiveness of Mitigating Measures:

Reduced damage to the environment.

TABLE D-10b. (continued)

Impacts

7. The large volume of plankton passing through the OTEC system may be killed by the temperature changes. This possibly could adversely affect the biotic chain.

Mitigating Measures:

None

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

8. Possible significant secondary impacts because of plans to attract extensive research activities to the area. In the long-term, the development of an abundant supply of inexpensive power and the possible availability of nutrient-rich water could attract a large amount of economic development to the surrounding area.

Mitigating Measures:

To be determined as part of specific proposals.

Financing of Mitigating Measures:

To be determined.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

TABLE D-11a.--CHARACTERISTICS OF OCEAN THERMAL
ENERGY CONVERSION PLANTS

Type of Energy Facility: Floating closed-cycle or open-cycle OTEC with a closed-cycle system; a fluid (ammonia, propane, or freon) is vaporized and used to drive a turbine. With an open-cycle system, surface water is vaporized under low pressure, and this steam drives the turbine.

Associated Developments:

- A floating platform
- Mooring lines
- A large cold water pipe with a diameter of up to 60 feet
- Underwater cables for transmitting electrical power to shore

General Description and Characteristics:

Form of Energy Produced: Electrical power

Energy Source: Warm surface waters and cold water from a depth of 2,000 to 3,000 feet

Capacity Range: Research OTEC: 50 K.W. to 200 M.W.
First generation OTEC: 100 to 400 M.W.

By- and Waste Products:

- Cold nutrient-rich water from lower depths, possibly containing very low residual chlorine (0.05 ppm)
- For open-cycle OTECs, fresh water

Area Requirements: Roughly 1 acre for platform, with a 2 to 5 mile watch circle

Site and Location Requirements:

In water:

- having a depth of approximately 3,000 feet,
- having a good bottom for mooring the OTEC platform,
- free from extreme winds and waves,
- near an area having a need for the electrical power output,
- near a port suitable for shore-based support operations, and
- situated so that the OTEC platform can be connected to shore with an underwater electrical cable.

The most likely location for a major OTEC plant is off the Waianae coast near HECO's Kahe Power Plant.

Status of Technology and Extent of Development:

- OTEC is now undergoing research with some small plants.
- A pilot plant should go into preliminary design in 1981 under U.S. DOE funding.
- The first full-scale demonstration plant is planned for initial operation in the late 1980s.

Other Distinguishing Features:

TABLE D-11b.—SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR OCEAN THERMAL ENERGY CONVERSION PLANTS

Impacts

1. A slight cooling of the surrounding waters with undetermined secondary impacts caused by discharging the cold deep waters.

Mitigating Measures:

The thermal impact can be minimized by returning mixed discharges to a depth where the impact is negligible.

Financing of Mitigating Measures:

Government and private funds to research secondary impacts and appropriate mitigating measures.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

2. Biostimulation in the nearby waters as a result of discharging the nutrient-rich deep waters.

Mitigating Measures:

Probably none, since the impact may be beneficial.

Financing of Mitigating Measures:

Government and private funds to research impacts and appropriate mitigating measures.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

3. Slight to negligible impacts from discharging very low concentrations (0.05 ppm) of the chlorine used to control biofouling.

Mitigating Measures:

Probably none, since the concentrations are below those for sewage plant discharges. But environmental monitoring is appropriate.

Financing of Mitigating Measures:

Monitoring cost paid by the operator and/or government.

Anticipated Effectiveness of Mitigating Measures:

Detection of chlorine concentrations and environmental damage.

TABLE D-11b. (continued)

Impacts

4. Probable kill (but possible stimulation) of plankton and organisms in larval stages that pass through the OTEC system.

Mitigating Measures:

To be researched.

Financing of Mitigating Measures:

Government and private funds to research impacts and appropriate mitigating measures.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

5. Small risk of accidental discharge of the working fluid (ammonia, propane, or freon) for a closed-cycle system, and of the biofouling agent (chlorine), resulting in harmful effects to marine life.

Mitigating Measures:

Proper design and maintenance to maintain structural integrity of the pressure system and piping, along with a leak detection system.

Financing of Mitigating Measures:

Increased cost paid by the developer and operator.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of leakage of the working fluid.

6. Aggregation of fish.

Mitigating Measures:

None, since the impact is beneficial.

Financing of Mitigating Measures:

None

Anticipated Effectiveness of Mitigating Measures:

N.A.

TABLE D-11b. (continued)

Impacts

7. A physical obstacle to ships and boats.

Mitigating Measures:

Proper lighting and notice to mariners.

Financing of Mitigating Measures:

Increased cost paid by the OTEC developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced obstacle to navigators.

8. Slight visual intrusion.

Mitigating Measures:

None

Financing of Mitigating Measures:

None

Anticipated Effectiveness of Mitigating Measures:

N.A.

9. Possible significant secondary effects if the OTEC facility should generate an excess supply of power that attracts a large amount of economic and population growth. This could require such infrastructure facilities and services as roads, water, sewage waste disposal, schools, libraries, parks, police, fire, and health.

Mitigating Measures:

To be determined. The size of an OTEC plant will probably be a State decision, and the secondary impacts will be largely controlled by Federal, State, and County agencies.

Financing of Mitigating Measures:

None at this time.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

TABLE D-12a.--CHARACTERISTICS OF ETHANOL PRODUCTION FACILITIES

Type of Energy Facility: *Distillery for producing ethanol*

Associated Developments:

General Description and Characteristics:

Form of Energy Produced: *Ethanol (ethyl alcohol), which can be mixed with gasoline to produce gasahol*

Energy Source: *Molasses, sugar, pineapple juice, agricultural waste, or even garbage*

Capacity Range:

By- and Waste Products: *Stillage, which can possibly be processed into animal feed or fertilizer*

Area Requirements:

Site and Location Requirements: *Removed from populated areas*

Status of Technology and Extent of Development: *Developed technology, but subsidies are required to make gasahol competitive with gasoline*

Other Distinguishing Features:

TABLE D-12b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR ETHANOL PRODUCTION FACILITIES

Impacts

1. Malodors from distillation process and waste products.

Mitigating Measures:

Confinement of odors.

Financing of Mitigating Measures:

Increased cost paid by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced odor problems.

2. Vector problems.

Mitigating Measures:

Appropriate vector control measures.

Financing of Mitigating Measures:

Increased cost paid by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced vector problems.

3. Small risk of fire or explosion.

Mitigating Measures:

Normal procedures to minimize risk.

Financing of Mitigating Measures:

Increased cost paid by operator.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of fire or explosion.

TABLE D-13a.--CHARACTERISTICS OF MUNICIPAL SOLID-WASTE-FUELED
ENERGY FACILITIES

Type of Energy Facility: *Municipal facility to process solid wastes to produce usable energy*

Associated Developments:

- Access road to handle numerous trucks
- Electrical power lines
- Landfill for disposing of bottom ash

General Description and Characteristics:

Forms of Energy Produced: *Steam, electrical power, and possibly fuel gas*

Energy Source: *Household, commercial, and industrial wastes*

Capacity Range: *Up to 1,800 tons of wastes per day*

By- and Waste Products: *Possible recovery of ferrous metals, aluminum, newspapers, and glass*

Area Requirements: *15 to 30 acres*

Site and Location Requirements: *An area suitable for noxious industries (downwind and remote from residential and commercial areas)*

Status of Technology and Extent of Development: *A major power plant fueled with municipal trash and bagasse will be built on Oahu in 1980.*

Other Distinguishing Features:

TABLE D-13b.--SIGNIFICANT IMPACTS AND MITIGATING IMPACTS
FOR MUNICIPAL SOLID-WASTE-FUELED ENERGY
FACILITIES

Impacts

1. Noise and dust during construction.

Mitigating Measures:

Minimize noise and dust by using special equipment and watering construction area.

Financing of Mitigating Measures:

Provided by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced noise and dust levels.

2. Air pollution from stack emissions.

Mitigating Measures:

A facility with a high degree of combustion, electrostatic precipitators for removing particulates, and possibly scrubbers for control of gaseous emissions.

Financing of Mitigating Measures:

Provided by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced air pollution.

3. Dust and odor.

Mitigating Measures:

Drawing of air into the combustion unit in order to contain the dust and odor, burning at high temperatures to eliminate the odor, and use of baghouses to control dust.

Financing of Mitigating Measures:

Provided by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced dust and odor.

TABLE D-13b. (continued)

Impacts

4. Noise from trucks and plant operation.

Mitigating Measures:

Siting and access design to minimize community exposure, restricted hours for trucks, and use of devices to control noise (acoustic treatment, wall and earth barriers, muffling equipment, etc.).

Financing of Mitigating Measures:

Provided by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced exposure to noise.

5. Water pollution from washdowns, cleanings, surface runoff, and leachates.

Mitigating Measures:

Pretreatment of effluents prior to discharge into the sewer.

Financing of Mitigating Measures:

Provided by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced water pollution.

6. Negative visual impact of the plant and trucks.

Mitigating Measures:

Siting and access design to minimize community exposure, landscaping, and maximum enclosure of work areas.

Financing of Mitigating Measures:

Provided by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced exposure to the plant.

TABLE D-31b. (continued)

Impacts

7. Litter along the access road.

Mitigating Measures:

Frequent clean-up of litter.

Financing of Mitigating Measures:

Provided by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced litter.

TABLE D-14a.--CHARACTERISTICS OF OIL RECOVERY FACILITIES

Type of Energy Facility: *Recycling of waste oil into light fuel oil*

Associated Developments:

General Description and Characteristics:

Form of Energy Produced: *Light fuel oil*

Energy Source: *Waste oil*

Capacity Range: *1 million gallons per year for the existing facility on Oahu*

By- and Waste Products: *None*

Area Requirements: *About 2 acres*

Site and Location Requirements: *An industrial area on an island with an adequate supply of waste oil. Hawaii's only oil recovery facility is located at Campbell Industrial Park on Oahu.*

Status of Technology and Extent of Development: *Developed technology*

Other Distinguishing Features:

TABLE D-14b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR OIL RECOVERY FACILITIES

Impacts

1. Adverse visual appearance.

Mitigating Measures:

Placement of the facility in an area of minimum visibility.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced visibility.

TABLE D-15a.--CHARACTERISTICS OF FUEL STORAGE TANKS

Type of Energy Facility: *Large storage tanks for crude oil, jet fuel, gasoline, etc.*

Associated Developments:

- Pipelines to supply the storage tanks and to deliver the oil or fuel to where needed. In most cases, there will be facilities for transferring the oil or fuel to or from ships and barges.*
- A heating system*
- Transfer pumps*
- A rain impoundment and disposal system*

General Description and Characteristics:

Form of Energy Produced:

Energy Source:

Capacity Range: *Up to 10 million barrels for a large field of storage tanks*

By- and Waste Products:

Area Requirements: *Up to 120 acres*

Site and Location Requirements: *An industrial area suitable for noxious industries (downwind and remote from residential and commercial areas); near facilities for off-loading large, deep-draft tankers; near processing and commercial centers; availability of water and other utilities; land that is inexpensive, relatively flat, high enough so that excavations avoid encountering water tables, capable of supporting heavy loads; of low permeability so as to limit subsurface runoff from spills and flooding; and safe from hazards (earthquakes, tsunamis, lava flows, storm winds and waves, blasts, etc.)*

Status of Technology and Extent of Development: *Large storage tanks are located throughout the Islands, and more have been proposed.*

Other Distinguishing Features:

TABLE D-15b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR FUEL STORAGE TANKS

Impacts

1. Dust and noise during construction.

Mitigating Measures:

Minimize noise and dust by using special equipment and watering construction area.

Financing of Mitigating Measures:

Increased cost of construction paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced dust and noise levels.

2. Lost vegetation and habitat for animals and birds.

Mitigating Measures:

Location of storage tanks and pipelines so as to avoid or minimize adverse impacts on environmentally sensitive areas.

Financing of Mitigating Measures:

Increased cost paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced loss of vegetation, animal and bird habitats.

3. Hydrocarbon emissions during filling of storage tanks.

Mitigating Measures:

Hydrocarbon emissions minimized by using tanks with floatable roofs, and locating tanks so that the emissions are blown out to sea.

Financing of Mitigating Measures:

Increased cost of construction paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced emissions, resulting in a minor impact on air quality.

TABLE D-15b. (continued)

Impacts

4. Adverse visual appearance of the storage tanks.

Mitigating Measures:

Landscaping and painting tanks pastel colors.

Financing of Mitigating Measures:

Increased cost paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Slight improvement in appearance.

5. Risk of a tanker oil spill that would be a threat to sea birds. If an oil spill should occur during on-shore winds, then there would also be a threat to marine biota in the intertidal zone and nearshore waters.

Mitigating Measures:

No unloading of oil during on-shore winds, combined with normal operations to detect spills, contain and clean them up, and restore the environment insofar as possible.

Financing of Mitigating Measures:

Increased cost of construction paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Little reduction in risk to sea birds. Reduced risk to marine biota in the intertidal zone and nearshore waters.

6. Possible on-site oil spills and seepage into the groundwater.

Mitigating Measures:

Areas subject to spills should be paved and drained to a waste treatment facility.

Financing of Mitigating Measures:

Increased cost paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of contamination of groundwaters.

TABLE D-15b. (continued)

Impacts

7. Possible but unlikely rupture of a storage tank.

Mitigating Measures:

Dikes surrounding the storage tanks to contain spills and sump pumps to recover the fuel.

Financing of Mitigating Measures:

Increased cost paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk of damage from ruptured storage tanks.

8. Small risk of fire or explosion.

Mitigating Measures:

Physical separation from other activities and facilities, and standard safety precautions.

Financing of Mitigating Measures:

Increased cost of construction paid by the developer.

Anticipated Effectiveness of Mitigating Measures:

Reduction in danger of fire or explosion, and reduction in exposure for other activities and facilities.

TABLE D-16a.--CHARACTERISTICS OF THE OAHU ENERGY CORRIDOR

Type of Energy Facility: *Energy corridor connecting manufacturing and storage areas to distribution areas*

Associated Developments:

- Harbor facilities
- Storage tanks
- Refineries
- Electrical generating plants

General Description and Characteristics:

Forms of Energy Produced: *Transported: oil, gas, and electrical power*

Energy Source: *Oil, gas, and electrical power*

Capacity Range: *5 buried pipelines*

By- and Waste Products: *None*

Area Requirements: *3.6 acres for easement*

Site and Location Requirements: *20-mile route between Honolulu Harbor and Campbell Industrial Park*

Status of Technology and Extent of Development: *Existing*

Other Distinguishing Features: *The corridor has an easement of width 30 feet along the land and 100 feet along the water.*

TABLE D-16b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR THE OAHU ENERGY CORRIDOR

Impacts

1. Possible leakages of fuels, resulting in odors, fire and safety risks, and environmental damage.

Mitigating Measures:

Restrictions barring development along the corridor; burying of the pipes; use of anti-corrosion measures; inspections and devices to detect leakages; measures to shut off flows during leakages; and containment, clean-up, and repair of leaks.

Financing of Mitigating Measures:

Increased cost paid by users.

Anticipated Effectiveness of Mitigating Measures:

Minimal risk from leakage of fuel.

2. Slight odors and pumping noises at terminals.

Mitigating Measures:

Placement of terminals in industrial areas, and installation of devices to control noises and odors.

Financing of Mitigating Measures:

Increased cost paid by users.

Anticipated effectiveness of Mitigating Measures:

Minimal problems from noises and odors.

TABLE D-17a.--CHARACTERISTICS OF COAL HANDLING FACILITIES

Type of Energy Facility: *Facilities for receiving coal at Honolulu Harbor, trucking it to Campbell Industrial Park, storing it, and grinding it.*

Associated Developments:

--Cement plants

General Description and Characteristics:

Form of Energy Produced: *Coal dust for burning*

Energy Source: *Low-sulfur coal*

Capacity Range: *60,000 to 80,000 tons of coal per year (4 to 6 shiploads)*

By- and Waste Products: *None*

Area Requirements:

Site and Location Requirements:

--Harbor for receiving coal

--A heavy industrial area (i.e., Campbell Industrial Park) for the cement plant

Status of Technology and Extent of Development: *Developed technology. Both of Hawaii's two cement companies are now being converted to burn coal rather than oil.*

Other Distinguishing Features: *When a shipload of coal arrives for the larger of the two cement companies, about 13 trucks will be used around the clock for 5 days to transport the coal from Honolulu Harbor to Campbell Industrial Park.*

TABLE D-17b.--SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR COAL HANDLING FACILITIES

Impacts

1. Reduced stack emissions of gases and particles because of coal ash being absorbed by the cement.

Mitigating Measures:

N.A.

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

2. Nominal amounts of coal dust during unloading of ships, loading of trucks, and unloading of the trucks.

Mitigating Measures:

Dust suppressants and collectors.

Financing of Mitigation Measures:

Minor cost paid by operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced dust.

TABLE D-18a.--CHARACTERISTICS OF OFFSHORE MOORING FACILITIES
FOR TRANSFERRING OIL PRODUCTS

Type of Energy Facility: *Permanently anchored mooring buoys for large oil tankers and barges*

Associated Developments:

- Large submarine pipelines for unloading crude oil from large tankers and loading refined fuels into barges and small tankers*
- A field of large storage tanks*

General Description and Characteristics:

Form of Energy Produced: *Transferred: Crude and refined oil*

Energy Source: *Crude and refined oil*

Capacity Range:

By- and Waste Products: *None*

Area Requirements:

Site and Location Requirements:

Waters that:

- are offshore from the industrial area to and from which the oil will be transferred*
- are sufficiently deep for large, deep-draft tankers*
- have ocean currents and tradewinds that would carry oil spills out to sea*

Status of Technology and Extent of Development: *Developed technology*

Other Distinguishing Features:

TABLE D-18b.—SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR OFFSHORE MOORING FACILITIES FOR
TRANSFERRING OIL PRODUCTS

Impacts

1. Turbidity and sedimentation during dredging for submarine pipelines, and fish kill during blasting for buoy anchors.

Mitigating Measures:

Location of mooring buoys so as to avoid environmentally sensitive areas.

Financing of Mitigating Measures:

Increased cost paid by developer.

Anticipated Effectiveness of Mitigating Measures:

Reduced damage to sensitive environmental areas.

2. Exclusion of fishing and recreational boating from the anchorage areas.

Mitigating Measures:

Limit boating activities only when a tanker is moored.

Financing of Mitigating Measures:

None

Anticipated Effectiveness of Mitigating Measures:

Minimum exclusion of boating activities.

3. Possible oil spill from tankers and loss of marine and bird life, particularly along the shoreline if the oil should be blown on-shore.

Mitigating Measures:

No loading or unloading of oil and fuels during on-shore winds, combined with normal operations to detect spills, contain and clean them up, and restore the environment insofar as is practical.

Financing of Mitigating Measures:

Increased cost paid by the operator.

Anticipated Effectiveness of Mitigating Measures:

Little reduction in risk to sea birds. Reduced risk to marine biota in the intertidal zone and nearshore waters.

TABLE D-19a.--CHARACTERISTICS OF HARBOR FACILITIES
FOR OIL HANDLING

Type of Energy Facility: Harbor, piers, and pipelines for handling oil products

Associated Developments:

- Storage tanks
- Support facilities for ships and harbor operations

General Description and Characteristics:

Form of Energy Produced: N.A.

Energy Source: Crude or refined oil

Capacity Range: N.A.

By- and Waste Products: None

Area Requirements: 330 acres for the new Barbers Point Harbor

Site and Location Requirements: Areas suitable for handling large ships

Status of Technology and Extent of Development: There are harbors throughout the State, and a new one is planned for Barbers Point.

Other Distinguishing Features: Most harbors throughout the State have been in existence for a number of decades, and adjustments to them have stabilized. The major exception is the new Barbers Point Harbor that is planned for dredging during the early 1980s.

TABLE D-19b. SIGNIFICANT IMPACTS AND MITIGATING MEASURES
FOR HARBOR FACILITIES FOR OIL HANDLING

Impacts

1. Destruction of existing marine community during dredging.

Mitigating Measures:
None

Financing of Mitigating Measures:
N.A.

Anticipated Effectiveness of Mitigating Measures:
N.A.
2. Destruction of cultural sites during development.

Mitigating Measures:
Excavation and salvage of archaeological sites and paleontological resource recovery prior to construction, and preservation of valuable sites.

Financing of Mitigating Measures:
Increased cost paid by the Federal and State governments.

Anticipated Effectiveness of Mitigating Measures:
Reduced loss of cultural sites.
3. Possible loss of endangered plants.

Mitigating Measures:
Propagation of endangered plants in locations suitable for their preservation.

Financing of Mitigating Measures:
Increased cost paid by the Federal and State governments.

Anticipated Effectiveness of Mitigating Measures:
Preservation of endangered plants.

TABLE D-19b. (continued)

Impacts

4. Loss of marginal sugarcane lands and habitats for common shorebirds.

Mitigating Measures:

None

Financing of Mitigating Measures:

N.A.

Anticipated Effectiveness of Mitigating Measures:

N.A.

5. Siltation during dredging and stockpiling.

Mitigating Measures:

Channel dredging suspended during heavy seas. Possible use of silt barriers or containment facilities for the nearshore portion of the channel. Closure at the basin entrance during basin dredging. Sediment basins for settling out suspended material from dredge liquid during stockpiling.

Financing of Mitigating Measures:

Increased cost paid by the Federal and State governments.

Anticipated Effectiveness of Mitigating Measures:

Reduced siltation.

6. Visual impact of stockpiled dredgings and harbor development.

Mitigating Measures:

Landscaping to improve appearance and to control dust.

Financing of Mitigating Measures:

Increased cost paid by the Federal and State governments.

Anticipated Effectiveness of Mitigating Measures:

Slight improvement in appearance.

TABLE D-19b. (continued)

Impacts

7. Noise and air pollution during construction.

Mitigating Measures:

Conformance to applicable government regulations.

Financing of Mitigating Measures:

Increased cost paid by the Federal and State governments.

Anticipated Effectiveness of Mitigating Measures:

Reduced noise and air pollution.

8. Traffic congestion.

Mitigating Measures:

Flagmen to coordinate traffic flow during construction.
Widening of roads to handle increased traffic.

Financing of Mitigating Measures:

Increased cost paid by the Federal and State governments.

Anticipated Effectiveness of Mitigating Measures:

Improve traffic flow.

9. Possible oil spills:

Mitigating Measures:

Normal operations to avoid spills, to detect them, contain and clean them up, and restore the environment insofar as practical.

Financing of Mitigating Measures:

Cost paid by ship or pipeline operator.

Anticipated Effectiveness of Mitigating Measures:

Reduced risk of oil spills and resulting damage.

TABLE D-19b. (continued)

Impacts

10. Major secondary impact of accelerated urbanization of the area surrounding a large new harbor.

Mitigating Measures:

State and County urbanization controls.

Financing of Mitigating Measures:

To be determined.

Anticipated Effectiveness of Mitigating Measures:

To be determined.

BIBLIOGRAPHY

<u>Subjects</u>	<u>Page</u>
Hawaii Coastal Zone Management Program	1
Coastal Energy Impact Program	1
General Energy Activities	1
Alternative Energy	2
Refineries	2
Electric Companies	3
Sugar Companies	3
General Biomass and Trash	4
Energy Tree Farms	4
Alcohol	4
Solar	4
Geothermal	4
Ocean Thermal Energy Conversion	4
Fuel Storage Tanks	5
Oahu Energy Corridor	5
Harbors	5
General Regulations	5

BIBLIOGRAPHY

Hawaii Coastal Zone Management Program:

Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, Department of Commerce, and Hawaii Department of Planning and Economic Development, Final Environmental Impact Statement and Proposed Coastal Zone Management Program for the State of Hawaii, Honolulu, Hawaii, 1978.

Coastal Energy Impact Program:

1979 Catalog of Federal Domestic Assistance, Washington, D.C.

U.S. Department of Agriculture, Rural Development Service, "Coastal Zone Management Act Amendments of 1976." Facts on Rural Development Resources, Washington, D.C., n.d.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, "Coastal Energy Impact Program," Federal Register, Part III, Vol. 44, No. 99, Washington, D.C., May 21, 1979.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, "Coastal Energy Impact Program, Proposed Administrative Procedures for Implementation," Federal Register, Part V, Vol. 44, No. 54, Washington, D.C., March 19, 1979.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, "Implementation of the Coastal Energy Impact Program, Proposed Administrative Procedures Regarding Grants and Credit Assistance," Federal Register, Part IV, Vol. 44, No. 10, Washington, D.C., January 15, 1979.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Coastal Energy Impact Program, General Criteria for the Use of Special Circumstance Lower Interest Loans, Washington, D.C., August 25, 1978.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management, The Coastal Energy Impact Program and Your Community, Washington, D.C., January 1979.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management, Coastal Energy Impact Program, Directory of Approved Projects from June 1, 1977 through January 1, 1979, Washington, D.C., January 5, 1979.

General Energy Activities:

Department of Planning and Economic Development, Energy Use in Hawaii, Honolulu, Hawaii, November 1977.

Department of Planning and Economic Development, State Energy Plan, Preliminary Draft #3, Honolulu, Hawaii, 1979.

Alternative Energy:

Committee on Alternative Energy Sources for Hawaii of the State Advisory Task Force on Energy Policy, Alternative Energy Sources for Hawaii, Hawaii Natural Energy Institute, University of Hawaii and the Department of Planning and Economic Development, State of Hawaii, Honolulu, Hawaii, February 1975.

Department of Planning and Economic Development, The Hawaii Integrated Energy Assessment Project, Handbook on Renewable Alternative Energy Resources in the State of Hawaii, Honolulu, Hawaii, May 1979.

Department of Planning and Economic Development, The Hawaii Integrated Energy Assessment Project, Rules, Regulations, Permits, and Policies Affecting the Development of Alternative Energy Sources in Hawaii, Honolulu, Hawaii, March 1979.

Department of Planning and Economic Development, State Energy Resources Coordinator 1978 Annual Report, Honolulu, Hawaii, January 1979.

Hawaii Natural Energy Institute, Hawaii Natural Energy Institute Annual Report 1978, University of Hawaii at Manoa, Honolulu, Hawaii, 1978.

Hawaii Natural Energy Institute, Natural Energy Resources Development, Project Summaries, Honolulu, Hawaii, July 1979.

Hawaii Natural Energy Institute, University of Hawaii, and the Department of Planning and Economic Development, State of Hawaii, Alternative Energy Sources for Hawaii, Honolulu, Hawaii, February 1975.

Hawaii State Senate, Committee on Economic Development and Energy, Legislative Energy RD&D Workshop Handbook, Volumes I and II, Honolulu, Hawaii, November 1979.

Masuda, Ralph, Arthur Seki, Patrick K. Takahashi, and Paul C. Yuen, Energy Self-Sufficiency for the County of Maui, Volumes I, II, and III, the Hawaii Natural Energy Institute, Honolulu, Hawaii, June 1978.

Senate Energy/Natural Resources Committee, A Comprehensive Energy Program for Hawaii, Honolulu, Hawaii, November 1977.

SRI International, Energy Self-Sufficiency for the Big Island, Five Energy Development Paths and Their Implications, June 1979.

Refineries:

Conoco-Dillingham Oil Company, Conoco-Dillingham Refinery, Barbers Point, Oahu, Hawaii, Summary Environmental Report, Honolulu, Hawaii, 1972.

Final Environmental Impact Statement for the Proposed Expansion of Foreign-Trade Subzone 9A (HIRI Oil Refinery), Foreign-Trade Zones Board, U.S. Department of Commerce, Washington, D.C., May 1974.

Electric Companies:

Environmental Report for Kahe Power Plant, in support of Hawaiian Electric Company's Application to the Department of Health for a Zone of Mixing Designation, Honolulu, Hawaii, February 1972.

Hawaii Electric Light Company, Annual Report of Hawaii Electric Light Co., Inc. to the Federal Energy Regulatory Commission for the Year Ended December 31, 1978, Hawaii, December 31, 1978.

Hawaiian Electric Company, Annual Report of Hawaiian Electric Co., Inc. to the Federal Energy Regulatory Commission for the Year Ended December 31, 1978, Honolulu, Hawaii, December 31, 1978.

Kauai Electric Division of Citizens Utility Company, Annual Report of Kauai Electric Division of Citizens Utility Company to the Public Utilities Commission, Eleele, Hawaii, December 31, 1978.

Maui Electric Company, Annual Report of Maui Electric Co., Ltd. to the Federal Energy Regulatory Commission for the Year Ended December 31, 1978, Hawaii, December 31, 1978.

Molokai Electric Company, Annual Report of Molokai Electric Co., Ltd. to the Public Utilities Commission, Kaunakakai, Hawaii, December 31, 1978.

Pacific Analysis Corporation, An Inventory and Analysis of the Electrical Energy Industry in the State of Hawaii, Honolulu, Hawaii, March 29, 1977.

Shanks, Kenneth J., Inventory of Power Plants in the United States--April 1979, U.S. Department of Energy, Washington, D.C., May 25, 1979.

Sugar Companies:¹

Hawaiian Sugar Planters' Association, 1978 Factory Equipment, Honolulu, Hawaii, April 1979.

Murata, Donald, and Warren Gibson, "Energy Inventory for Hawaiian Sugar Factories--1975," Hawaiian Planters' Record, Vol. 59, No. 5, Hawaiian Sugar Planters' Association, Honolulu, Hawaii, 1977.

¹Also see the seventh entry under Electric Companies.

General Biomass and Trash:

Department of Health and City and County of Honolulu, 208 Water Quality Management Plan for the City and County of Honolulu, Volume I, Honolulu, Hawaii, October 1978.

Hawaii Biomass Energy Study Team of Stanford University and the University of Hawaii, Biomass Energy for Hawaii, Volume I--Summary and Background, Volume II--Sugar Operation, Volume III--Mixed Municipal Refuse, Volume IV--Terrestrial and Marine Plantations, Institute for Energy Studies, Stanford University, Stanford, California, February 1977.

Energy Tree Farms:

Department of Land and Natural Resources, Hawaii Division of Forestry, Energy Tree Farm Program, Honolulu, Hawaii, September 1979.

Alcohol:

Murata, Donald, "Alcohol Production," Technical Report No. 5, Fuels from Biomass, The Hawaii Natural Energy Institute, Honolulu, Hawaii, April 1978.

Solar:

Department of Planning and Economic Development, An Index of Solar Companies in the State of Hawaii, (7/78 to 7/79), Honolulu, Hawaii, 1979.

Department of Planning and Economic Development, Solar Energy: Hawaii and the U.S. Islands of the Pacific, Honolulu, Hawaii, March 1978.

Geothermal:

Department of Land and Natural Resources, Regulations on Leasing of Geothermal Resources and Drilling for Geothermal Resources in Hawaii, Regulation 8, Honolulu, Hawaii, June 1978.

Kamins, Robert M., Revised Environmental Impact Statement for the Hawaii Geothermal Research Station Utilizing the HGP-A Well at Puna, Island of Hawaii, Department of Planning and Economic Development, Honolulu, Hawaii, March 1978.

Ocean Thermal Energy Conversion:

R. M. Towill Corporation, Environmental Impact Statement for the Natural Energy Laboratory of Hawaii at Ke-ahole Point, Hawaii (Phase I), The Research Corporation of the University of Hawaii, Honolulu, Hawaii, December 1976.

Fuel Storage Tanks:

Department of Planning and Economic Development, State of Hawaii,
Feasibility Study of Local Options for Strategic Petroleum Storage
in Hawaii, Honolulu, Hawaii, August 1978.

Oahu Energy Corridor:

Department of Transportation, Modified Environmental Impact Statement,
Establishment of Energy Corridor on Oahu, Honolulu, Hawaii,
November 15, 1971.

Hawaii Architects and Engineers, Inc., Negative Declaration and
Environmental Impact Assessment for the Proposed Route Modification
of the Energy Corridor, Honolulu, Hawaii, December 1976.

Harbors:

Department of the Army, U.S. Army Engineer District Honolulu, Hawaii,
Barbers Point Harbor Final Environmental Impact Statement, and
Appendix A--Benefit Analysis, Honolulu, Hawaii, July 1976.

Department of the Army, U.S. Army Engineer District Honolulu, Hawaii,
Barbers Point Harbor, Supplement to the Final Environmental Impact
Statement, Honolulu, Hawaii, January 1977.

Department of the Army, U.S. Army Engineer District Honolulu, Hawaii,
Draft Formulation Design Memo for Barbers Point Harbor, Honolulu,
Hawaii, April 1976.

M&E Pacific, Inc., Revised Environmental Impact Statement for the Barbers
Point Deep-Draft Harbor on Oahu, Honolulu, Hawaii, June 1978.

General Regulations:¹

Department of Planning and Economic Development, Hawaii Coastal Zone
Management Program, A Register of Government Permits Required for
Development, Honolulu, Hawaii, December 1977.

Mandelker, Daniel R., Legal Aspects of Hawaii's Coastal Zone Management
Program, Hawaii Coastal Zone Management Program, Document 6,
Department of Planning and Economic Development, Honolulu, Hawaii,
August 1975.

¹Also see the third entry under Alternative Energy.

